



6 Grand Avenue, Rosehill NSW

Hale Capital Development Management Pty Ltd

Remedial Action Plan

61873 | 155,370

1 November 2024





We acknowledge the Traditional Custodians of Country throughout Australia and their connections to land, sea and community.

We pay respect to Elders past and present and in the spirit of reconciliation, we commit to working together for our shared future.

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Abbreviations

Term	Definition
ACM	Asbestos Containing Materials
AHD	Australian Height Datum
AMP	Asbestos Management Plan
ASS	Acid Sulfate Soils
bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
CEMP	Construction Environmental Management Plan
COPC	Contaminant of Potential Concern
CSM	Conceptual Site Model
DECCW	NSW Department of Environment, Climate Change and Water
DP	Deposited Plan
DQOs	Data Quality Objectives
ENM	Excavated Natural Material
HIL	Health Investigation Level
JBS&G	JBS&G Australia Pty Ltd
ha	Hectare
LTSMP	Long-Term Site Management Plan
OCP	Organochlorine Pesticides
OEH	Office of Environment and Heritage
PAHs	Polycyclic Aromatic Hydrocarbons
PASS	Potential Acid Sulfate Soils
PCB	Polychlorinated Biphenyls
POEO Act	Protection of Environment Operations Act
SAQP	Sampling, Analysis and Quality Plan
TRH	Total Recoverable Hydrocarbons
UST	Underground Storage Tank
VENM	Virgin Excavated Natural Material
VOCs	Volatile Organic Carbons

1. Introduction

JBS&G Australia Pty Ltd (JBS&G) has been engaged by Hale Capital Development Management Pty Ltd (Hale, 'the client') to complete a remedial action plan (RAP) for proposed redevelopment at the property located at 6 Grand Avenue, Rosehill NSW (the site). The site is legally identified as Lot 1 in development plot (DP) 1258587 and occupies a total area of approximately 4.2 hectares (ha) and its location is shown on **Figure 1**. The site was previously part of a larger property that included land to the south of the site. The larger property was recently subdivided and redevelopment of the southern lot (Stage 1) is currently occurring as shown on **Figure 2**.

The site is currently occupied by CSR Building Products Ltd (CSR) and is used for the manufacture of roof tiles. The site includes a number of warehouses and also includes significant outdoor storage areas for tiles. The warehouses at the site were operational at the time of the assessment, and most of the outdoor space was utilised for package and material storage purposes.

A number of historical investigations have been completed at the site to assess the potential for contamination to be present that have identified asbestos in soils. This RAP details the procedures that will be implemented to remediate impacted soils in accordance with guidelines made or endorsed by the NSW Environment Protection Authority (EPA) and in consideration of the principles of ecologically sustainable development (ESD).

1.1 Objectives

The proposed remediation strategy aims to manage asbestos impacted soils during the site remediation works, and to develop a long term management plan to demonstrate no unacceptable health or ecological risks from impacts left in-situ.

To achieve this strategy, the specific objectives of this RAP are to:

- Summarise the site characteristics;
- Summarise the previous findings of site contamination assessments for the purposes of establishing the extent of contamination;
- Define the extent of remediation required;
- Assess appropriate remediation options including consideration of ESD principles;
- Provide details of the proposed remediation methodology, including consideration of relevant regulatory requirements as well as associated safety and environmental management controls;
- Establish the requirements for the selection of criteria relevant to the future use of the site; and
- Provide details of the environmental characterisation / validation program (including reporting).

1.2 Reports Relied Upon

A number of historical investigations have been completed at the site to assess the potential for contamination to be present which is associated with existing and historical uses. The following contamination investigations or validation reports completed for the site have been reviewed for preparation of this RAP:

- *Environmental Site Investigation, 10 Grand Avenue, Rosehill, NSW, KPMG SGA, 26 July 2016, (KPMG SGA 2016);*
- *Human Health Risk Assessment, 10 Grand Avenue, Camellia, NSW, JBS&G, 19 July 2017 (JBS&G 2017a)*
- *Remedial Action Plan, 10 Grand Avenue, Camellia, NSW, JBS&G, 19 July 2017 (JBS&G 2017b);*
- *Long-Term Site Management Plan (LTSMP), 10 Grand Avenue, Rosehill, NSW, Douglas Partners Pty Ltd, 9 January 2019, (Douglas 2019a);*
- *Remediation Action Plan, Lot 1, 10 Grand Avenue, Camellia, NSW, Edison Environmental & Engineering Pty Ltd, 9 January 2019 (Edison 2019b);*
- *Addendum to Remedial Action Plan, 10 Grand Avenue, Rosehill, NSW, Douglas Partners Pty Ltd, 18 December 2019, (Douglas 2019);*
- *Site Audit Report, Remediation Action Plan, Audit No. RS 117, Lot 1, 10 Grand Avenue, Camellia, NSW, Ramboll Australia Pty Ltd, 27 March 2020, (Ramboll 2020a);*
- *Site Audit Statement, Remediation Action Plan, Statement No. RS 117, Lot 1, 10 Grand Avenue, Camellia, NSW, Ramboll Australia Pty Ltd, 27 March 2020, (Ramboll 2020b); and*
- *Environmental Site Investigation, 6-8 Grand Avenue, Rosehill, NSW, JBS&G, 29 April 2022 (JBS&G 2022).*

In addition, JBS&G has obtained the following NSW EPA documentation for 6 Grand Avenue, Camellia (former Akzo Nobel Chemical Factory, adjacent property to the west):

- Site Audit Statement – Area A, Rod Hardwood, 30 April 2012 (Hardwood 2012a);
- Site Audit Statement – Area B, Rod Hardwood, 30 April 2012 (Hardwood 2012b);
- Site Audit Statement – Area C, Rod Hardwood, 30 April 2012 (Hardwood 2012c);
- Notice for Maintaining Remediation (number 28002), issued 26 August 1998 from NSW EPA to Akzo Nobel Chemicals Limited (EPA 1998);
- Declaration of remediation site (number 21035), issued 21 January 2003;
- Agreed Voluntary Remediation Proposal (number 26051), issued 29 October 2003 from NSW EPA to Akzo Nobel Chemicals Pty Ltd (EPA 2003);
- Agreed Voluntary Remediation Proposal (number 26117), issued 23 February 2009 from NSW EPA to Akzo Nobel Chemicals Pty Ltd (EPA 2009); and
- Approved Voluntary Management Proposal (number 20101705), issued 30 March 2010 from NSW EPA to Akzo Nobel Chemicals Pty Ltd (EPA 2010).

Assessment for the hydrogeological upgradient site have been reviewed as the migration of contamination attributed to the site is considered responsible for the contamination encountered on the site.

2. Site Condition and Surrounding Environment

2.1 Site Identification

The site is located at 6 Grand Avenue, Rosehill, NSW. The site location is shown on **Figure 1**. The site layout and associated cadastral boundaries are shown on **Figure 2** and key details are summarised in **Table 2.1**.

Table 2.1: Summary of Site Details and Surrounding Conditions

Title Identification	Lot 1 DP 1258587
Address	6 Grand Avenue, Rosehill, NSW
Local Government	City of Parramatta
Easting	E: 318085
Northing	N: 6255844
Site Zoning	E5 - Heavy Industrial (Parramatta Local Environmental Plan 2023)
Previous Use	Industrial
Proposed Use	Commercial / Industrial
Off-site Area	Approximately 4.2 hectares (ha)

2.2 Site Description

A site inspection was undertaken by JBS&G on 5 October 2021.

The site is operated by CSR Building Products. Site operations included construction earthworks along the east driveway, a main warehouse building in the north where tile manufacturing is undertaken and large areas of outdoor storage including tile and timber products, sealed drums containing dangerous goods, sand, a processing silo and forklift refuelling area (gas).

The site contained three large buildings. The tile manufacturing building located in the northern portion, the office/administration building was located to the south of the manufacturing building and a storage building in the southeast portion.

Entry and exit from the site is via Grand Avenue along the eastern boundary. Car parking for the site was located to the east of the office/administration building. The eastern boundary driveway was mostly barricaded due to construction works.

High traffic areas which were predominantly used by trucks and forklifts were concrete sealed. These were generally along the boundaries of the site and around the manufacturing building. The footprint of the former buildings in the central portion of the site was also sealed. The remaining areas, used for storage of tiles, were unsealed and consisted of compacted gravel or road base.

2.3 Geology

Review of 1:100,000 'Sydney' Geological Survey of NSW Sheet 9130 (1983) indicates the site and surrounds are underlain by Quaternary aged sediments including silty to peat quartz sand, silt and clay and man made fill potentially consisting of dredged estuarine sand and mud, demolition rubble industrial and household waste.

Previous investigations on site generally identified sandy fill material with anthropogenic inclusions including asbestos cement sheeting, ranging to a depth of 2.6 mbgs, above natural brown interbedded clays and sands.

2.4 Hydrogeology

Groundwater at the site was reported in KPMG SGA (2016) to be at a depth of approximately 0.64 and 2.78 metres below ground surface (mbgs). KPMG SGA identified that the groundwater flow at the site was generally to the east and north east. It is expected that regional groundwater would migrate towards Parramatta River located approximately 400m to the north east.

The underlying geology consisted of fill material and quaternary fluvial sediments. The quaternary sediments consist of sand, silt, clay and peat layers. As such, it is expected that groundwater beneath the site would have varying hydraulic conductivities and yields. It is expected that historical paleochannels exist within the vicinity of the site which may locally alter the groundwater flow direction.

2.5 Hydrology

Surface run-off at the sealed areas of the site is expected to enter the local stormwater system via collection drains located at the site. The final discharge location of the stormwater system is expected to be Parramatta River. Any surface water collected in the unsealed areas of the site are expected to infiltrate through the geology and contribute to the underlying groundwater system.

2.6 Acid Sulfate Soils (ASS)

Review of the ASS Risk Map (DLWC 1997¹) indicated that the site is located within an area of 'disturbed terrain', which is consistent with the site's location and geology. Soil investigations are required to assess these areas for acid sulfate soil potential.

Review of accessible data using the eSpade tool, hosted by NSW Office of Environment and Heritage (OEH) (2022) indicates the site is located within an area of 'disturbed terrain, elevation >4m AHD.'

2.7 Surrounding Land-use

The surrounding land uses are summarised as follows:

- North: Grand Avenue and beyond industrial land, followed by Parramatta River;
- East: industrial use including concrete recyclers, former Clyde Refinery and bitumen plant;
- South: commercial/industrial use including former James Hardie landfill (now a James Hardie warehouse) and former Clyde Refinery; and
- West: former Akzo Nobel site, Colquhoun Street and beyond Rosehill Racecourse.

The nearest potential sensitive ecological receptor is considered to be Parramatta River located approximately 200m to the north of the site.

¹ Prospect/Parramatta River Acid Sulfate Soil Risk Map (Edition 2), Department of Land and Water Conservation 1997, (DLWC 1997)

2.8 Site History

The site history has been based on the KPMG SGA (2016) Environmental Site Investigation. KPMG SGA (2016) reported that the site has been used for industrial purposes since at least 1930. The site was understood to have been occupied by CRS Building Limited (or associated companies) for over 100 years for tiles production and storage.

The factory originally occupied the northern portion of the site with additional buildings constructed in the central and southern portions of the site between 1965 and 1982. These buildings were demolished in approximately 2015. KPMG (2016, **Section 3.7**), reported that two decommissioned Underground Storage Tanks (USTs) were present in the eastern boundary of the site, with a capacity of 16,000L each, one of which contained diesel product and the other petrol. Although the USTs were reported to have been decommissioned, it was not known whether the USTs remained in-situ.

The surrounding land had been used for industrial use since 1930. A review of available information indicated that the industrial activities were likely associated with manufacturing. The adjacent property to the west (Akzo Nobel, 6 Grand Avenue) was known to undertake chemical manufacturing. Chemicals associated with the Akzo Nobel property include hexavalent chromium and volatile chlorinated hydrocarbons.

A former James Hardie landfill is understood to be located to the south west of the site. The historical material placed with the landfill and the original landfill design is unknown. However, assessment of other James Hardie landfills in the Parramatta area has identified an abundance of asbestos containing materials.

2.9 Proposed Development

The development plans are provided in **Appendix A**. It is understood that the client is proposing to redevelop the site for commercial purposes that will comprise the demolition of existing structures and subsequent construction of a large multi-level commercial / industrial building. All structures are constructed at grade (i.e. no basements or underground levels) and there are minimal landscaped areas as part of the proposed development. As such, consideration has been given to the relevant land-use of "HIL D - Commercial/industrial, includes premises such as shops, offices, factories and industrial sites" as detailed in National Environment Protection (Assessment of Site Contamination) Measure, 1999 (as amended 2013), National Environment Protection Council (NEPC 2013).

3. Summary of Previous Investigations

As listed in **Section 1.2** several previous investigations have been completed for the site. The scope and results of these investigations are summarised in the following sections. Copies of analytical results summary tables for these reports are provided in **Appendix B** (for soils and sub-slab vapour) and in **Appendix C** (for groundwater).

3.1 Voluntary Remediation Proposal (no. 26051) (EPA 2003)

The Voluntary Remediation Proposal (number 26051) (VRP 26051) was issued by NSW EPA to Akzo Nobel Chemicals Pty Ltd on 29 October 2003. The contaminants in the soil and groundwater at the site were listed in the VRP 26051 as volatile chlorinated hydrocarbons (including carbon tetrachloride, chloroform, dichlorodifluoromethane and trichloromethane) and chromium.

Akzo Nobel had been addressing the chromium contamination on the eastern portion of the site since 1990 and the VCH contamination on the southwestern portion of the site since 1996. The remediation strategy adopted was primarily cap and contain with ongoing extraction of contaminated groundwater both at the source area and at the downgradient of the site boundary to prevent the contamination from migrating offsite. As the groundwater extraction was expected to continue, the NSW EPA issued the VRP 26051 to ensure ongoing involvement of the site.

The VRP 26051 outlines the reporting requirements for ongoing groundwater monitoring which also includes the perpetration of annual monitoring reports.

3.2 Voluntary Remediation Proposal (no. 26117) (EPA 2009)

The Voluntary Remediation Proposal (number 26117) (VRP 26117) was issued by NSW EPA to Akzo Nobel Chemicals Pty Ltd on 23 February 2009. The VRP 26117 stated that the site is contaminated with substances in such a way as to present a significant risk of harm. The contaminants were listed as carbon tetrachloride, chloroform and hexavalent chromium.

The remedial works were to be undertaken in three stages. These stages were listed as:

- Stage 1 – Area A – north eastern portion of the site;
- Stage 2 – eastern former chrome residue pond; and
- Stage 3 – western former chrome residue ponds and Area B (south western portion of site).

The Stage 1 remedial works were to be undertaken immediately at the time the VRP 26117 was issued. The proposed remedial works consisted of the excavation of impacted soil, treatment of soil and reuse of soil. On site treatment of VCH impacted groundwater was to be addressed through the construction of a groundwater re-circulation system in excavation Area A to continue in-situ treatment.

The milestones (i.e. commencement date) for the Stage 2 and 3 remediation works were proposed to be provided within an additional voluntary remediation proposal.

3.3 Voluntary Remediation Proposal (no. 20101705) (EPA 2010)

The Voluntary Remediation Proposal (number 20101705) (VRP 20101705) was issued by NSW EPA to Akzo Nobel Chemicals Pty Ltd on 30 March 2010. The VRP 20101705 was produced document the remedial milestones required for the Stage 2 and 3 remedial works.

The proposed remedial works to be undertaken in Area B comprised:

- Excavation of the secondary containment sources in soil and groundwater;
- On site treatment of carbon tetrachloride contaminated soil. Treated soil will be validated as suitable for re-use on site before being replaced in the excavations; and
- Construction of groundwater extraction recirculation system in excavation Area B to continue in-situ treatment if needed.

After a period of operation, estimated at 6-12 month but likely longer, the groundwater treatment / remediation system will be switched off. The data collected will show that:

- There is no significant off-site migration of contamination; and
- The plume is stable or diminishing and groundwater migrating off site does not contain contaminated concentrations above agreed site criteria.

3.4 Site Audit Statement – Area A (Hardwood 2012a)

Rod Hardwood from Environmental Strategies was engaged as Site Auditor for a portion of the adjoining Akzo site (referred to as Area A) and issued a Section B Site Audit Statement (SAS) for 6 Grand Avenue Camellia on 30 April 2012. Area A was located in the north-eastern portion of the site and was approximately 700m² in area.

The SAS stated that the site could be made suitable for a commercial/industrial land use subject to compliance with the following conditions:

- The SAS is read in conjunction with the Site Audit Report (10058 SAR 125a: Area A dated 30 April 2012);
- Groundwater pumping and treatment resulting in the hydraulic containment of groundwater in the vicinity of Area A is required to continue until groundwater information and modelling can accurately and reliably demonstrate to the NSW EPA and Environmental Auditor that no off-site migration of contamination above acceptable criteria will occur;
- An Environmental Management Plan (EMP), compliant with the Guidelines for the NSW Site Auditor Scheme (2nd Edition) (2006) is required to be completed and implemented within 6 months of the date of the SAS. In accordance with the guidelines, the NSW EPA and Site Auditor will require to be consulted on the EMP prior to finalisation of the document;
- Until the above condition is discharged, site works are required to be conducted in accordance with the EES Revised Interim Site Management Plan for the site (dated 19 December 2011);
- A holistic site groundwater monitoring programme is to be established in consultation with NSW EPA and the Site Auditor. Part of the programme will require the following items for groundwater in the vicinity of Area A to be addressed:
 - Assessment of the number and location of shallow groundwater monitoring wells in and around Area A;
 - Assessment of the number and location of deep groundwater monitoring wells in and around Area A;

- Assessment of shallow and deep groundwater monitoring wells around the pile walls along the northern and eastern site boundary;
- Groundwater monitoring programme to adequately assess all the main contaminants of concern, hydrogeological effects in the area including hydraulic depression due to pumping and mounding due to backfill of Area A to 98% and the installation of the pile wall;
- Assessment of groundwater flow around the pile walls and into Grand Avenue and to the East onto the adjacent site; and
- Assessment of groundwater quality coming into the vicinity of Area A

The Auditor further commented that it still required to be demonstrated the sub-slab vapour concentrations in Area A are at an acceptable level for continued commercial/industrial site use. This Auditor reported that acceptability may change depending on climatic conditions and sensitive parameters such as soil moisture. It is therefore imperative for individual architectural footprint proposals to measure these sensitive parameters and consider them in the design of any buildings and assess the need for specific vapour mitigation systems as appropriate.

3.5 Site Audit Statement – Area B (Hardwood 2012b)

Rod Hardwood from ES was further engaged as a Site Auditor for the area of the adjoining site referred to as Area B. Mr Harwood issued a Section B SAS for Area B, 6 Grand Avenue Camellia on 30 April 2012. Area B was located in the western portion of the site and was approximately 6,750m² in area.

The SAS stated that the site could be made suitable for a commercial/industrial land use subject to compliance with the following conditions:

- The SAS is read in conjunction with the Site Audit Report (10058 SAR 125b: Area B dated 30 April 2012);
- An Environmental Management Plan (EMP), compliant with the Guidelines for the NSW Site Auditor Scheme (2nd Edition) (2006) is required to be completed and implemented within 6 months of the date of the SAS. In accordance with the guidelines, the NSW EPA and Site Auditor will require to be consulted on the EMP prior to finalisation of the document;
- Until the above condition is discharged, site works are required to be conducted in accordance with the EES Revised Interim Site Management Plan for the site (dated 19 December 2011);
- No buildings or structures are to be constructed over Area B without an adequate soil vapour assessment to ensure that adequate construction design and vapour abatement is incorporated, if required, to protect site workers;
- A holistic site groundwater monitoring programme is to be established in consultation with NSW EPA and the Site Auditor. Part of the programme will require the following items for groundwater in the vicinity of Area A to be addressed:
 - Assessment of the number and location of shallow groundwater monitoring wells in and around Area B;
 - Assessment of the number and location of deep groundwater monitoring wells in and around Area B;
 - Assessment of shallow and deep groundwater monitoring wells around the western site boundary;
 - Groundwater monitoring programme to adequately assess all the main contaminants of concern, (including containment issues related to the 'black product (HCBP) identified during

excavations), hydrogeological effects in the area due to the backfilling of Area B to 98% standard level of compaction; and;

- Assessment of groundwater quality upgradient and downgradient of Area B

3.6 Site Audit Statement – Area C (Hardwood 2012c)

Rod Hardwood from ES as role as Site Auditor issued a Section B SAS for an area referred to as Area C, within the adjoining 6 Grand Avenue Camellia site on 30 April 2012. Area C was located in the central portion of the (Akzo) site and was approximately 2,900m² in area.

The SAS stated that the site could be made suitable for a commercial/industrial land use subject to compliance with the following conditions:

- The SAS is read in conjunction with the Site Audit Report (10058 SAR 125c: WCLRP dated 30 April 2012);
- An Environmental Management Plan (EMP), compliant with the Guidelines for the NSW Site Auditor Scheme (2nd Edition) (2006) is required to be completed and implemented within 6 months of the date of the SAS. In accordance with the guidelines, the NSW EPA and Site Auditor will require to be consulted on the EMP prior to finalisation of the document;
- Until the above condition is discharged, site works are required to be conducted in accordance with the EES Revised Interim Site Management Plan for the site (dated 19 December 2011);
- No buildings or structures are to be constructed over the WCLRP without an adequate soil vapour assessment to ensure that adequate construction design and vapour abatement is incorporated. This will also ensure protection of site workers and consideration within the design of the WCLRP containment cell will also be required to ensure the integrity of the cell is not compromised by loading of foundations.
Any need for engineering measures to mitigate vapours to permit the construction of buildings will need be addressed within the conditions of an Environmental Management Plan
- A holistic site groundwater monitoring programme is to be established in consultation with NSW EPA and the Site Auditor. Part of the programme will require the following items for groundwater in the vicinity of the Western CLRP to be addressed:
 - Assessment of the number and location of shallow groundwater monitoring wells in and around WCLRP;
 - Assessment of the number and location of deep groundwater monitoring wells in and around WCLRP;
 - Assessment of shallow and deep groundwater monitoring wells between the WCLRP and the eastern site boundary; and
 - Groundwater monitoring programme to adequately assess all the main contaminants of concern, due to the remediation conducted at the site.
- Ongoing shallow and deep groundwater monitoring will be required to demonstrate the effectiveness of the WCLRP containment cell over time. The frequency and extent of monitoring is to be agreed with NSW ERPA and the Site Auditor as part of the holistic site-wide groundwater monitoring programme to follow.
- Methane gas production from the organic barrier layer will require to be assessed conceptually over the next 2 years. Akzo Nobel will provide a summary report for discussion

on the state of methanogenesis and their options on how long the monitoring program should proceed for review by the Auditor or NSW EPA prior to monitoring.

3.7 Environmental Site Assessment (ESA) (KPMG 2016)

KPMG SGA (2016) undertook an environmental site investigation (ESI) at the site consisting of soil, groundwater and soil vapour investigations. The investigation was undertaken to assess areas of environmental concern including potential sources for neighbouring site.

The results of the investigation identified asbestos within the fill material. In addition, asbestos containing materials were observed on the soil surface and generally appeared to be associated with demolition of former buildings.

Slightly elevated concentrations of heavy metals (arsenic, cadmium, copper, lead and zinc), chloroform, carbon tetrachloride and tetrachloroethylene were identified within the groundwater at the site. Based on the laboratory results, groundwater flow direction (to the west or north west) and the review of the site history, it was considered that the source of the VCHs within the groundwater and soil vapour was the adjacent Akzo Nobel property.

Elevated soil vapour concentrations of chloroform, bromodichloromethane, benzene, naphthalene and carbon tetrachloride were identified beneath the site.

Information from SafeWork NSW indicated the historical presence of two underground storage tanks (USTs) in the eastern portion of the site. No evidence of the USTs was observed (fill points, dip points or covers). No information was provided indicating that the USTs had been decommissioned or removed. The potential USTs were not considered to pose a significant risk to the ongoing use of the site should they be present, however the USTs should be removed if present during redevelopment works.

The KPMG SGA (2016) assessment reported that data presented could be considered reliable for the purposes of characterising the site.

3.8 Human Health Risk Assessment (JBS&G 2017a)

A human health risk assessment (HHRA) was completed for the site, including the Stage 1 and Stage 2 development areas. The assessment considered the levels of volatile chlorinated hydrocarbons assessed by KPMG SGA (2016) along with the likely future site layout, and concluded that an unacceptable inhalation risk may exist to future site users. It was recommended that future construction works incorporate a vapour barrier below buildings.

3.9 Remedial Action Plan (JBS&G 2017b)

A Remedial Action Plan (RAP) was prepared to allow development of the site with management of the risks posed by contamination to be adequately protective of human health and the environment. The RAP included vapour mitigation controls below buildings, importation of approximately 1.5 m of Virgin Excavated Natural Material / Excavated Natural Material (VENM/ENM) to form the new site level and an ongoing management of the integrity of the vapour barrier via an Environmental Management Plan (EMP).

The RAP was prepared based on the results of the KPMG SGA (2016) ESA, the HHRA (JBS&G 2017a) and the provided development plans. The RAP identified an insufficient sampling density in the northern portion of the site (Stage 2) which may result in remedial / management strategies based on maximum levels of groundwater / soil vapour impacts in the Stage 1 area being unnecessarily adopted in the Stage 2 area. The present JBS&G ESA has targeted the Stage 2 area including a grid based soil vapour assessment and additional groundwater characterisation.

The RAP summarised EPA documentation for the characterisation and remediation of contamination present across the west site boundary at 6 Grand Avenue (former Akzo Nobel site). The remedial strategy for the former Akzo site has been implemented by the current site owner (Transport for NSW) and includes deep cutoff walls that are intended to prevent ongoing migration of groundwater contamination onto 6 Grand Avenue.

3.10 Long-Term Site Management Plan (Edison 2019a)

Edison Environmental & Engineering Pty Ltd (Edison) was engaged by Grand 4 Investment Pty Ltd (Grand 4) to prepare a long-term site management plan for 10 Grand Avenue, Camellia, NSW. Using previous reports, the investigation noted the following potential sources of contamination:

- Imported fill of unknown origin;
- Demolition residue;
- Historical industrial impacts; and
- Leak spills and inappropriate waste spill or storage of chemicals on-site and from adjoining properties.

The management plan acknowledged asbestos within the fill, as well as chlorinated hydrocarbon and heavy metal contamination of the soil and groundwater. The investigation refers back to the proposed remediation strategies in **Section 3.9** before suggesting several long-term management requirements:

- Regular inspections of the building to ensure physical integrity;
- No intrusive works without prior approval; and
- Prompt reporting of any unusual odours with subsequent ambient air sampling upon a report.

3.11 Remediation Action Plan (Edison 2019b)

Edison Environmental & Engineering Pty Ltd (Edison) was engaged by Grand 4 Investment Pty Ltd (Grand 4) to prepare a remedial action plan for 10 Grand Avenue, Camellia, NSW.

The RAP included vapour mitigation controls below buildings, placement of a marker barrier and importation of clean fill, location and removal or abandoned USTs, and secure capping and construction of a perimeter containment all around the former Akzo Nobel site to reduce contamination migrating on-site. Development of an asbestos management plan and an LTSMP was also recommended.

3.12 Addendum to Remedial Action Plan (Douglas 2019)

Douglas Partners undertook a review of the JBS&G RAP (2017) by request of Van der Meer Consulting. The review found that the RAP presented by Edison (2019b) was applicable and appropriate for the proposed site development. In addition, they provided a design for the proposed vapour barrier and ventilation layer based on the design in Edison (2019b) and suggested engineering investigations to further inform the design, including:

- Groundwater monitoring to evaluate the effectiveness of any remedial works at the Akzo Nobel site;
- Additional delineation of the VOC plume in groundwater;
- Additional work to re-evaluate the need for a vapour barrier proposed in the RAP (Edison 2019b).

The report also suggests that the development is unlikely to disturb and ASS or potential acid sulfate soils (PASS) but should the development plans change, an acid sulfate soils management plan (ASSMP) will have to be prepared and implemented.

3.13 Site Audit Report (no. RS 117) (Ramboll 2020a)

The Audit was conducted to provide an independent review by an EPA Accredited Auditor of the suitability and appropriateness of the remediation action plan and was conducted by Rowena Salmon of Ramboll Australia (Ramboll). Several reports dating back to 2012 were reviewed or referenced for the purpose of the audit.

The existing buildings were outside of the chlorinated hydrocarbon plume and were determined to be at low-risk of vapour intrusion. Groundwater was determined not to be extracted for beneficial use without further assessment.

The report stated that successful implementation of the Edison RAP (2019b) would render the site suitable for the proposed land use. An LTEMP would be required, as well as, validation of success of each of the proposed remedial strategies and a sampling, analysis and quality plan (SAQP).

3.14 Site Audit Statement (no. RS 117) (Ramboll 2020b)

Rowena Salmon from Ramboll was engaged as a Site Auditor for 10 Grand Avenue, Rosehill, NSW. Salmon issued a SAS for the site on 27 March 2020.

The SAS stated that the site could be made suitable for a commercial/industrial land use subject to compliance with the following conditions:

- No basements are permitted in the final design;
- No piling for the buildings, only slab on ground construction;
- Hard surface to cover most of the site with only minor landscaping;
- Ground level is to be raised 1.5 m with a minimum of 0.5 m of clean imported soil; and
- No groundwater is to be extracted for beneficial reuse.

In addition, the Auditor required the preparation of an SAQP to confirm the extent of contamination in groundwater and inform the proposed building layout and vapour controls. A remedial works plan would also be required to document the extent of the building footprint and required vapour controls determined by the SAQP. Following remedial and development works, preparation of a site audit statement is required.

3.15 ESA (JBS&G 2022)

JBS&G (2022) undertook an ESA at the site consisting of soil, groundwater and soil vapour investigations. The investigation was undertaken to assess the requirements of the JBS&G RAP (2017b) to further characterise the site. The areas of environmental concern were:

- Chlorinated hydrocarbon impacts within soil vapour across the site;
- Asbestos containing materials within fill material at the site; and
- Heavy metals and chlorinated hydrocarbons within the groundwater.

A grid based sub-slab vapour assessment was undertaken within accessible areas of the site. A total of 40 sub-slab vapour locations were completed. Results identified predominantly non-detect concentrations of volatile organic carbon (VOCs) (including chlorinated hydrocarbons) below site pavements. There were no exceedances of the adopted conservative screening level criteria. Vapour assessment results were consistent with the low level of volatile contaminants assessed in groundwater,

and were indicative of levels that would not suggest an unacceptable risk to future site users in a commercial / industrial setting.

Six monitoring wells were installed and sampled during the investigation. All reported contaminants of potential concern (COPCs) were below the adopted criteria within groundwater with the exception of some elevated levels of heavy metals. Heavy metal concentrations were considered indicative of urban background concentrations. Low levels of some chlorinated hydrocarbons were assessed in groundwater near the site west boundary but were lower than those previously reported in the KPMG SGC (2016) assessment.

During installation of soil vapour probes and the groundwater monitoring wells, soils samples were collected. There were no unacceptable odours or staining seen during soil logging. The reported concentrations of all contaminants of concern in soil samples were below the adopted criteria protective of human health under the proposed land-use, aside from friable asbestos analysed in some soil samples.

Sample locations are marked in **Figure 3**, exceedances are displayed in **Figure 4**.

4. Conceptual Site Model (CSM)

A detailed CSM for the site has been included in EMM (2021b) and is briefly summarised in this Section. NEPC (2013) identified the essential elements of a CSM as including:

- Known and potential sources of contamination and contaminants of concern including the mechanism(s) of contamination;
- Potentially affected media (soil, sediment, groundwater, surface water, indoor and ambient air);
- Human and ecological receptors;
- Potential and complete exposure pathways; and
- Any potential preferential pathways for vapour migration (if potential for vapours identified).

Each of these elements is discussed in the following sections.

4.1 Known Sources of Contamination

Historical industrial activities on and in proximity of the site have been identified as potential sources of contamination. The site history assessment and review of previous reports for the site identified the following main potential contamination sources:

- Imported fill material of unknown origin;
- Impacts associated with historical industrial use; and
- Leaks spills, inappropriate waste disposal or inappropriate storage of chemicals on-site and from adjoining properties.

As discussed in **Section 3** the site and surrounding properties have been subjected to a number of previous investigations which have identified the presence of fill contaminated with asbestos. While these investigations identified groundwater contaminated with chlorinated hydrocarbons and heavy metals, recent data shows that this is no longer a concern (JBS&G 2022). Remediation works at the former Akzo Nobel site have severely limited migration of upgradient groundwater contamination and heavy metal concentrations are considered indicative of urban background concentrations and do not require management.

It is noted that ASS have also been identified as a potential environmental issue on the site. However, the management of these materials will be undertaken through development of an ASSMP.

4.2 Potential for Migration from Site

Contaminants generally migrate from site via a combination of windblown dusts, rainwater infiltration, groundwater migration and surface water runoff. The potential for contaminants to migrate is a combination of:

- The nature of the contaminants (solid/liquid and mobility characteristics);
- The extent of the contaminants (isolated or widespread);
- The location of the contaminants (surface soils or at depth); and
- The site topography, geology, hydrology and hydrogeology.

The potential contaminants identified above from previous investigation are generally in either a solid form (e.g. asbestos) or liquid form (e.g. heavy metals, chlorinated hydrocarbons, etc).

With respect to whether these pathways are complete it is noted that:

- The predominant surface cover currently on the site of hardstand pavements and building footprints would limit, or negate, the potential for migration to occur by most of these pathways. This would also be the case following redevelopment of the site as per the design plans (**Appendix A**).
- With respect to groundwater, the elevated heavy metals are considered to be indicative of urban background concentrations, and would likely be no higher than those levels currently present in the Parramatta River.

4.3 Potential Human or Ecological Receptors

Table 4.1 summarises potential human receptors and associated exposure pathways for the site identified based on the range of exposure scenarios that may occur under standard commercial / industrial use of the site.

Potential human populations who may be exposed to site impacts in the future (if they are not remediated or appropriate management is not implemented prior to or during development) include:

- Future construction and site maintenance workers; and
- Future and current sub-surface excavation and intrusive workers.

Given the current developed nature of the site (i.e. concrete hardstand, no exposed soils) asbestos impacts within the fill does not pose a risk to current site users. Future sub-surface construction/maintenance workers that are working beneath the hardstand and in direct contact with fill material may be exposed to asbestos impacts.

Table 4.1: Summary of Potential Exposures

Area	Potentially Source of Impact	Receptor	Exposure Pathways for Commercial Use (Complete or Not Complete?)				Comment
			Inhalation - Particulates	Inhalation – Vapour	Oral	Dermal	
Site	Potentially Impacted soil	Commercial worker	C ¹	C	C ¹	C ¹	Considered low Risk: There is potential for asbestos containing material (ACM) to be present in fill material underlying the full extent of the site. Exposure to this ACM impacted fill can be managed through an EMP, as well as via the implementation of the proposed remedial strategy (cap and contain). Additionally, given the absence of decommissioning documentation, there is potential for USTs to remain present at the site. The potential for USTs or related infrastructure to be present underlying the site can be managed via the implementation of the UFP and assessed vis testpitting in the inferred UST locations to confirm their presence/absence. Although some elevated chloroform concentrations were identified in groundwater and soil vapour by KPMG (2016), the source of these impacts was on-site migration from contamination on the adjoining site to the west. The adjoining site to the west has since been remediated and site assessment completed by JBS&G (2022) did not identify chlorinated hydrocarbon contamination to groundwater or soil vapour. Source material was not identified on the site by JBS&G (2022), and any potential residual chlorinated hydrocarbon impacts will be highly localised. Any potential preferential pathway for vapour migration would be limited to the extent of pile outlines, which would comprise only a small fraction of the building footprint and is not consistent with uniform volatile sources of volatile impact, which vapour intrusion risk is based on. Therefore, there would be low potential for piles to increase the risk for potential deeper vapour impacts to affect the extent of vapour intrusion via a preferential pathway. Similarly, placement of piling spoil recovered from depth would have allow potential to increase the risk from vapour intrusion, if placed beneath the pavement, subject to assessment of any odourous material
		Site Visitor	C ¹	C	C ¹	C ¹	
		Maintenance Worker (underground)	C ¹	C	C ¹	C ¹	
	Potentially impacted groundwater	Commercial worker	-	C	N	N	Considered low Risk: Current heavy metals concentrations are within the range of urban background levels. Chlorinated hydrocarbons concentrations have decreased to a level below the site adopted criteria (JBS&G 2022). The requirement to prevent all users from contacting groundwater at depth can be managed through an EMP.
		Site Visitor	-	C	N	N	
		Maintenance Worker (underground)	-	C	C	C	
Adjacent surface	Potentially impacted	Commercial worker	-	C	C	C	Considered low risk: Current heavy metals concentrations are within the range of urban background levels and would likely be no higher than those levels currently

Area	Potentially Source of Impact	Receptor	Exposure Pathways for Commercial Use (Complete or Not Complete?)				Comment
			Inhalation - Particulates	Inhalation – Vapour	Oral	Dermal	
water receptors	seepage/ surface runoff	Maintenance Worker (underground)	-	C	C	C	present in the Parramatta River. Chlorinated hydrocarbons concentrations have decreased to a level below the site adopted criteria. (JBS&G 2022).

Notes: - = Pathway not valid C = potentially complete exposure pathway N = exposure pathway not complete

1. Pathway is only considered potentially complete where the surface of the site is unsealed at the surface.

5. Remediation Options

With respect to options for remediation Section 1.5 of the NSW EPA (2020) ‘Contaminated Land Guidelines: Consultants Reporting on Contaminated Land’ states that a RAP must:

- “...• assess options and remedial technologies to achieve the remediation objectives and select and justify a preferred approach, which must include the consideration of the principles of ecologically sustainable development”; and also
- “...• ensure remediation is consistent with relevant laws, policies (including planning instruments and policies) and guidelines and reference these in the remedial action plan.”

The discussion presented in **Sections 5.1 to 5.3** has been based on these guiding statements.

5.1 Remedial Goal

The goal for the remediation and/or management of environmental impact is to:

- Remove unacceptable risks to site workers, or visitors to the site, posed by impacted site media; and
- Complete remediation work in accordance with the principles of ecologically sustainable development (ESD).

5.2 Extent of Remediation

Based on the CSM, the results of previous investigations have indicated that impacts remain relating to the presence of asbestos in buried fill materials. The impacted materials require remediation and/or management to reduce the risks to human health and the environment and permit future redevelopment and continued commercial and industrial land use.

In determining the extent of remediation, management measures to be adopted as part of the site redevelopment have first been identified. The proposed management measures are required as part of the development consent (**Section 2.9**) for the new commercial premises:

- Continued implementation of an LTEMP at the site to control potential human exposures to sub-surface contaminants on completions of the remediation works. This will specifically address potential free asbestos fibres and ACM in soil;
- Sealed surfaces installed over the majority of the site as per the current design plans (**Appendix A**). The sealed surface would have the added benefit of precluding potential direct exposure to site soils for all above-ground site users. The LTEMP will ensure the retention of the surface cover in good condition and/or reinstatement as required; and
- Importation of material to increase site levels and/or used in the proposed landscaped areas of the site. These imported materials will need to be delineated from underlying potentially impacted soils by a concrete slab or demarcation layer / mesh which will be noted and controlled as per **Sections 6.7 and 6.8**.
- KPMG (2016) identified the potential presence of two UST within the eastern portion of the site. Test pits are to be excavated in the inferred UST locations to confirm their presence/absence. If UST are encountered in the test pits or during civil works, decommissioning works will be completed under an UFP in accordance with Underground

Petroleum Storage Systems (UPSS) Regulation 2019². Following the removal of the UST (if applicable) validation sampling will be completed to confirm concentrations of COPC are within site validation criteria.

5.3 Guidance Framework

The Contaminated Land Management (CLM) Act 1997 is the primary legislation associated with management of contaminated land in NSW. Section 105 of the Act allows the EPA to make or endorse guidelines connected with the objectives of the Act. These guidelines form the basis for making decisions in relation to the investigation, remediation, validation and documentation of contaminated land management within NSW.

As such, this RAP and future activities associated with assessment, remediation and validation will address the requirements of those guidelines. The current list of relevant NSW EPA endorsed guidelines comprises:

- *Sampling Design Guidelines*, NSW EPA August 2022;
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, ANZECC 2000;
- *Guidelines for Consultants Reporting on Contaminated Sites*, NSW EPA (reprinted) 2011;
- *Guidelines for the NSW Site Auditor Scheme*, 3rd Ed, EPA 2017;
- *Guidelines for the Assessment and Management of Groundwater Contamination*, NSW Department of Environment, Climate Change and Water (DECCW), March 2007;
- *Environmental Health Risk Assessment: Guidelines for Assessing Human Health Risks from Environmental Hazards*, Dept. of Health and Ageing and EnHealth Council, CoA 2012;
- *National Environment Protection (Assessment of Site Contamination) Measure 1999, Amendment No.1*, NEPC 2013; and
- *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act, 1997*, NSW EPA 2015.

In addition, consideration is also required to guidelines made or endorsed by the EPA under the Protection of the Environment Operations (POEO) Act 1997 and associated regulations, including:

- *Guidelines for Implementing the POEO (Underground Petroleum Storage Systems) Regulation 2008*;
- *Waste Classification Guidelines, Part 1 - Classifying Waste*. NSW EPA 2014;
- *Waste Classification Guidelines, Part 2 – Immobilising Waste*. NSW EPA 2014; and
- *Waste Classification Guidelines, Part 3 - Waste Containing Radioactive Material*. NSW EPA 2014.
- *Waste Classification Guidelines, Part 4 – Acid Sulfate Soils*. NSW EPA 2014.

Other guidance that should also be considered in relation to site conditions includes:

- *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases*, NSW EPA (2012); and
- *Acid Sulfate Soil Manual*, Acid Sulfate Soil Management Advisory Committee 1998.

² Protection of the Environment Operations (Underground Petroleum Storage System) Regulation 2019 – August 2019

5.4 Assessment of Remedial Options

The Contaminated Land Management: Guideline for the NSW Auditor Scheme (EPA 2017) lists the following order of preference for soil remediation and management:

- On-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
- Off-site treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site;
- Removal of contaminated soil to an approved site or facility, followed where necessary by replacement with clean fill; and
- Consolidation and isolation of the soil on-site by containment within a properly designed barrier.

In addition, it is also a requirement that remediation should not proceed in the event that it is likely to cause a greater adverse effect than leaving the site undisturbed. And, where there are large quantities of soil with low levels of contamination, alternative strategies are required to be considered or developed (EPA 2017).

Remedial options have been assessed for the site as detailed in **Table 5.1** following.

5.5 Proposed Remedial Approach

As shown in **Table 5.1**, with consideration to EPA (2017) hierarchy for remediation and the principles of ecologically sustainable development the remediation strategy for the proposed development is presented below.

- Completion of the required pre-remediation plans by the Principal Contractor. These documents will need to be finalised prior to the commencement of remediation;
- Removal of the existing above ground structures (if any, unless agreement has been reached to retain elements). Survey and pegging of the lateral extent of the site;
- It is understood that all surplus spoil associated with piling will be placed beneath the marker layer and the client and it's builder has taken into consideration the anticipated volume to be accommodated within capping and design levels. Foundation piling material will be re-laid between the piles caps and located beneath the marker layer on site. This is to also include any excess material generated from services located beneath the existing slab on site. Marker layer shall be laid directly underside of roadbase where sealed surfaces are nominated to be constructed on site.
- For areas where the site surface is to be finished with a sealed surface, then on-site management of any ACM impacts that remain in-situ within soil by installation of a physical separation layer as follows:
 - Sealed surfaces to be retained onsite have the added benefit of precluding potential direct exposure to the site soils for all above-ground users. It is understood that as per the current design plans (**Appendix A**), there are areas with existing concrete slab to be retained as per the redevelopment. It is preferable for these areas to remain undisturbed, to reduce the exposure of impacted soils to site users. Therefore, in these areas the concrete slab will act as the marker layer. The LTEMP will ensure the retention of the surface cover in good condition and/or reinstatement as required.
 - In areas where concrete does not cover the surface then placement of a visual marker layer above the surface to visually distinguish between the materials below the current

site ground level and imported materials to be placed higher than this level. Survey / photograph marker layer once installed;

- Placement of imported (and validated) material across areas of the site requiring filling to reach the proposed construction level in accordance with the geotechnical specifications with a minimum of 0.3 m of clean imported fill. The imported material will be placed above the existing slab (where present), above the marker layer (where present);
- Construction of the building, including services, retaining wall and ground slabs as per the design plans once the required construction level has been achieved;
- KPMG (2016) identified chlorinated VOC impact in the western quarter of the site. There is the potential for remnant, localised VOC impacts within deeper piling spoil from this area of the site. To minimise potential vapour intrusion risk when retaining this material on-site beneath the pavement, deeper piling spoil from the western quarter of the site should be field screened using a PID fitted with a 11.7 eV lamp. Any material with a PID reading of greater than 10 ppm should be stockpiled, covered with plastic and sampled using a soil vapour probe placed to a minimum depth of 0.5 m into the stockpile. A soil vapour sample is to be collected using a suitable method and the samples sent for laboratory analysis to assess the potential for soil vapour impacts from the material. The remediation consultant will submit and obtain approval from the Site Auditor on any proposed sampling and analysis methods for assessing this material.

Table 5.1: Remediation Options Assessment Matrix

Remedial Option	Applicability	Assessment
1. On-site treatment so that the contaminants are either destroyed or the associated hazards are reduced to an acceptable level.	<u>Asbestos Impacts in Soil</u> Not viable option for asbestos impacts in soil.	<u>Asbestos Impacts in Soil</u> Not a suitable option.
2. Off-site treatment so that the contaminants are either destroyed or the associated hazards are reduced to an acceptable level, after which the soil is returned to the site.	<u>Asbestos Impacts in Soil</u> Not viable option for asbestos impacts in soil.	<u>Asbestos Impacts in Soil</u> Not a suitable option.
3. Excavation and off-site removal of the impacted soils.	<u>Asbestos Impacts in Soil</u> Viable option - there are currently suitably licensed waste facilities in the Greater Sydney Metropolitan area capable of accepting soil impacted by asbestos.	<u>Asbestos Impacts in Soil</u> A viable option but not the preferred option given the environmental impact of the transport of materials, waste generation and resource use in sourcing materials to re-instate the site to development levels being inconsistent with the principles of ESD.
4. On-site in-situ management of the soil by physical separation, and ongoing management.	<u>Asbestos Impacts in Soil</u> The proposed continued commercial use of the site means this approach is a possible option.	<u>Asbestos Impacts in Soil</u> <u>The preferred option.</u> The most suitable option and superior to Option 3 where viable as it will result in much lower resource consumption and waste generation. This is the most preferred remedial option available for land that will be used solely for commercial purposes in an established industrial area.

- For areas where the site surface is to be finished landscaping/vegetation the plan to remediate these areas will be presented in a separate Landscape Area Capping Plan which will be determined in conjunction with the project landscaper to either:
 - Install a physical separation layer comprising a marker layer overlain by at least 0.3m of imported (and validated) fill. The physical separation may need to be greater than 0.3 m, depending upon the landscaper's minimum requirements to maintain the proposed plantings. The required vegetation will then be planted in the layer of validated fill; or
 - Excavate all fill material across the extent of the proposed landscaped area. Dependent on the required finished level, vegetation can be planted at the base of the excavation and backfilled with growing medium, or reinstatement can occur with imported (and validated) fill to the required finished level before planting.
 - Due to potential for remnant, localised areas of impact in deeper soils, material at depth including clay would not be considered VENM and will not be suitable for reuse at the site unless validated or placed under the marker layer for ongoing management. Where excavated soil/piling returns are observed to be stained or odourous, these soils will be segregated and inspected via PID and/or analytical results to confirm suitability for onsite reuse;
 - Materials excavated and relocated onsite will need to be incorporated in the materials management/tracking requirements and documented in the validation report.
- The preparation of a long-term EMP to maintain the integrity of the capping layers and to manage any future disturbance to the underlying fill as well as restricting groundwater abstraction

The preferred remediation approach listed above for the site is to retain materials in-situ by providing physical separation between impacted fill/soil materials and receptors (e.g. site users). The combination of the existing concrete slab (or proposed marker layer), imported (and validated) fill layers and new ground slabs/landscaping areas at the raised site level will act as a physical separation layer at the site. The management approach prevents direct contact via these permanent sealed surfaces or minimum clean soil thicknesses and implementation of a long-term EMP to maintain the physical separation arrangements.

6. Remediation Plan

Sections 6.1 to 6.7 discuss the scope of the preferred remedial approach.

6.1 Approvals, licences and notifications

Approvals, licences and notifications required for the works are detailed in **Section 12**.

6.2 Roles and Responsibilities

Site Owner and Development Manager (the client): Responsible for appointing relevant organisations to undertake remediation of the site and stakeholder engagement (if required) and obtaining any appropriate approvals.

Principal Contractors (TBC): Responsible for undertaking the remediation works, waste management, licences, approvals (as requested by the site owner) establishment and maintenance of health, safety and environmental management controls to protect workers, public health and the environment during remediation of the Site.

Environmental Consultant (JBS&G): The environmental professional appointed by the Site Owner who will work with the Principal Contractor and be responsible for observing and monitoring of remediation field works, validation activities required under this RAP, and preparation of the validation reports upon completion of the remediation works.

Site Auditor: The Auditor has been appointed to this project by the Site owner to prepare a Site Audit Statement (SAS) on completion of the remediation works confirming the suitability of the site for commercial land use subject to implementation of the LTEMP.

6.3 General Remediation Overview

The proposed remediation strategy is intended to be implemented as per **Table 6.1**.

Table 6.1: Indicative Staging of Remediation Works

Task	Description	Details Provided In
1	Documentation and Auditor Approval of RAP <i>HOLD POINT 1: Auditor approval of RAP in writing to be obtained prior to completion of tasks 2 and beyond</i>	-
2	Preliminary Works – Stakeholder Consultation as required, including community consultation if necessary, preparation of plans for completion of remediation by the Principal Contractor	Section 6.4 and 10.15
3	Order/planning for capping materials and establishment of remediation works area on site including environment controls and security controls	Sections 6.8 and 7.5
4	Clearance of site surface in preparation ready for placement of marker layer. Completion of this stage will require: - Striping of vegetation and removal of above ground structures, if required; - Markup of proposed pile foundation locations; - Advancement of piling foundation; and - Survey of ground levels across cleared site and position of pile foundations.	Section 6.5
5	Controlled cutting of existing surface slab and installation of slab on ground foundations. <i>HOLD POINT 2: Landscape Area Capping Plan will need to be prepared in accordance with controls outlined in Section 5 of this document</i>	Sections 6.6 and 6.7
6	The placement of a visual marker layer in other areas of the site (where required) to visually distinguish between fill materials currently in-situ and imported soils used to raise site levels for the proposed remediation. Completion of this stage will require: - Completion of a survey of the lateral extents of the marker layer, and surface levels.	Sections 6.7 and 6.8 & Section 7.3.2
7	The importation of material validated as suitable ¹ for placement above the concrete capping layer, or marker layer, to raise site levels as required by the development plan. Completion of this stage will require: - Validation of VENM material at the source site prior to receipt at the site; - Confirmation by JBS&G that the material received at site is consistent with VENM sampled at the source site; and - Survey of ground levels at the site once the construction level has been reached. Note: Any new services required to be placed underground on the redeveloped site should be placed above the existing concrete slab/ marker layer wherever possible.	Sections 6.7, 6.8 and 7.3
8	Construction of the building foundations, ground slabs, retaining wall and peripheral landscaping areas as per design plans.	Section 6.9
9	Reporting of Validation Assessment and LTEMP by JBS&G.	Section 7.6
10	Obtain written Auditor endorsement of final Validation Assessment and LTEMP.	-

Notes:

1. This may include: imported virgin excavated natural material (VENM), excavated natural material (ENM) or similar material certified in accordance with an exemption issued by the NSW EPA that also meets site suitability criteria; or imported road making materials comprising fresh quarried material or material covered by a beneficial reuse exemption issued by the NSW EPA.

6.4 Preliminary Planning

The Principal Contractor, or their nominated representative, shall prepare all required documentation in accordance with the requirements of this RAP, including, but not limited to:

- A Work, Health and Safety Plan (WHSP) consistent with the requirements of **Section 11** and construction environmental management plan (CEMP) consistent with the requirements of **Section 10**. The proposed remediation works cannot commence until the above preliminary requirements have been met; and
- A capping plan for areas of the site that will not be finished with a sealed surface i.e. all landscaped areas. While the proposed remediation works may commence, no validated fill material shall be imported onto the site to raise ground levels prior to the Auditor approving the landscaped area capping plan.

6.5 Site Establishment

The site is a secured commercial property where safety and environmental controls are currently being implemented. However, to ensure the area affected by the remediation works is contained, remediation establishment measures will be required. These will include, but not be limited to:

- Tree removal as required, comprising the cutting of tree stumps flush with the existing ground surface.
- Location and isolation of all required utilities in the proximity of the works;
- Assess need for and implement any necessary traffic controls;
- Sediment fencing (attached to security fencing) where necessary; and
- Stormwater runoff and sediment controls (e.g. silt fences and hay bales) where necessary.

6.6 Capping of Site – In Areas of the Site where a Sealed Surface is Proposed

The extent of the site where sealed surfaces are proposed for the final surface are to be covered in the following capping layers (listed in order of placement i.e. from bottom to top):

- Use of the existing concrete ground slab (where present) as the base of the capping layer.
- In areas where concrete does not currently cover the surface, a marker mesh layer will be placed directly on top of the existing ground slab or grass cover. The marker layer must:
 - o Be easily recognisable within soils (e.g., bright orange in colour, or otherwise contrasting with the surrounding soil colour);
 - o Be durable as a long-term marker layer (i.e. > 150 grams per square metre); and
 - o Maintain integrity during the remaining remedial/civil works such as placement of capping soils.
- A layer of imported virgin excavated natural material (VENM), or other suitable material³ that has been validated, placed directly above the marker mesh layer with a minimum thickness of 0.3 m, or more if required to achieve the required construction level. The requirements for validation of VENM, or other suitable material, prior to receipt on are provided in **Section 7.5**.
- Construction of underground services, retaining wall and ground slabs as per the design plans and placement of the new site surface in the form of concrete slabs or vegetation.

The planned site redevelopment design is considered to provide a sufficient thickness of soil that is unlikely to be penetrated by future users of the site, and will incorporate use of a marker mesh layer (where required) to act as visual signal that potentially impacted fill material is present beneath. The configuration is consistent with the requirements of ANZECC (1999) *'Guidelines for the Assessment of On-Site Containment of Contaminated Soil'* for on-site containment being used to provide a physical separation layer.

JBS&G as the environmental consultant shall inspect and document the installation of the marker mesh layer at the time of these works. A set of survey plans produced by a registered surveyor will be used at a later stage to confirm the capping layers have been installed in accordance with the requirements of this RAP. Further details relating to the required survey plans are provided in **Section 7.3.2**.

³ This may include: imported virgin excavated natural material (VENM), excavated natural material (ENM) or similar material certified in accordance with an exemption issued by the NSW EPA that also meets site suitability criteria; or imported road making materials comprising fresh quarried material or material covered by a beneficial reuse exemption issued by the NSW EPA.

6.7 Capping of Site – In Areas of the Site where No Sealed Surface is Proposed

The following guidance should be used to formulate the capping requirements in the proposed landscaping area:

- In areas of proposed turfed / grassed surface – installation of the marker layer at a minimum depth of 300 mm below final finished site levels, with a capping layer consisting of environmentally suitable materials for potential human and/or ecological exposure.
- In areas of shallow landscaping areas – installation of the marker layer at a minimum depth of 300 mm below the final finished site levels, with a capping layer consisting of environmentally suitable materials for potential human and/or ecological exposure.
- New tree pit zones / deep landscaping zones – installation of the marker layer at a minimum depth of 1500 mm below the final finished site levels, with a capping layer consisting of environmentally suitable materials for potential human and/or ecological exposure, noting that the marker layer should extend the depth required for installation of the new tree's existing root ball or otherwise consistent with the anticipated root zone of the deep landscaping area.
- Existing tree zones – installation of the marker layer consistent with immediately adjacent marker layer depths (e.g., 300 mm in turfed areas and 300 mm in mass planting areas) to the extent practicable, with a capping layer consisting of environmentally suitable materials for potential human and/or ecological exposure.

Material above the marker layer extending to the final finished ground level will be required to be an environmentally suitable material for human and/or ecological exposure (as appropriate). This may include: imported virgin excavated natural material (VENM), excavated natural material (ENM) or similar material certified in accordance with an exemption issued by the NSW EPA that also meets site suitability criteria; or imported road making materials comprising fresh quarried material or material covered by a beneficial reuse exemption issued by the NSW EPA.

The capping plan for areas to be landscaped will need to detail validation requirements including inspections by the Remediation Consultant, and survey plans prepared by a registered surveyor showing the level and lateral extent of the impacted soils, marker layer, and capping in relation to the site boundaries.

6.8 Building Construction

Following the placement of imported (and validated) VENM, or other suitable material, to achieve the required design level, construction works can begin on the foundations, retaining wall, ground slabs and services for the new buildings proposed for the site. Works on the landscaping areas may also take place provided Auditor approval has been obtained for the capping plan for these areas.

It is understood that the underground services to be installed for the new development will be placed within the layer of imported VENM (or other suitable material) used to raise the site level and will remain above the ground slab that exists on the site at present. The installation and maintenance of these above slab services can take place without restriction provided that they do not disturb the existing ground slab. In the event, that the existing ground slab is disturbed, with works extending below the sealed surface, a marker layer is required to be installed as per requirements stated in **Section 6.6**.

7. Validation Plan

7.1 Overview

The effectiveness of the remedial works needs to be validated to confirm the actions required by this RAP have been successfully completed.

The following sections establish the Data Quality Objectives (DQOs) to be adopted during capping and validation of the site.

7.2 Data Quality Objectives

Data Quality Objectives (DQO's) have been developed for the site validation and are discussed in the following sections.

7.2.1 State the Problem

Previous investigations have identified the presence of asbestos (as ACM and asbestos fibres/friable asbestos) in fill material beneath the existing ground surface and elevated levels of chlorinated hydrocarbons and heavy metals in the groundwater. While the offsite sources associated with the chlorinated hydrocarbons have been remediated, and heavy metal results were determined to be indicative of urban background concentrations, asbestos in fill remains beneath the site. In addition to the observed asbestos impacts, and due to the limited intrusive soil sampling completed at the site, potential remains for undetected impacts to be encountered, and redundant USTs and UST related infrastructure to be present in former UST locations at the site. Notwithstanding, the presence of asbestos in fill underlying the site and any potential unidentified impacts present at the site, which may be encountered during development, require remediation to enable redevelopment for continued commercial land use.

7.2.2 Identify the Decision

The following decisions are required to be made during the validation works:

- Is the existing surface of the site absent of visible asbestos?
- Has a visual marker layer been placed over the existing site surface?
- Has the visual marker layer been capped with at least 0.5m of imported material classified as VENM?
- Has the surface of the capping layer been finished with an impermeable surface or landscaping?
- Has a Long Term Environmental Management Plan been prepared?

7.2.3 Identify Inputs to the Decision

The inputs to the decision are:

- Field observations, sampling and analytical data from excavation and relocation works;
- Observation and photographic log of encapsulation works to excavation areas;
- Survey data of site levels recorded prior to and post placement of capping layers;
- Field observations, sampling and analytical data of any unexpected finds;
- Documentation of appropriate classification of imported materials, if any; and
- Environmental monitoring data to demonstrate that potential airborne asbestos contamination as generated by the handling of asbestos impacted materials on the site has not impacted off-site locations.

7.2.4 Define the Study Boundary

The study boundaries of the site are defined as follows:

- The lateral extent of the site, as shown on **Figure 2**, and to be confirmed in a survey plan prepared by a registered Surveyor; and
- The vertical extent of remediation works is considered to be highest point of the proposed raised site level.

7.2.5 Develop a Decision Rule

Analytical data will be assessed against EPA published / endorsed criteria for constituents of concern:

- NSW EPA (2017), Guidelines for the NSW Site Auditor Scheme 3rd Edition, October 2017; and
- NEPC (2013), National Environment Protection (Assessment of Site Contamination) Measure, National Environment Protection Council, 1999.

However as the decision rules adopted in **Section 7.2.2** require consideration of factors other analytical data the decision rules to be adopted for each are discussed below.

Is the existing surface of the site absent of visible asbestos?

A visual clearance of the existing surface shall be undertaken by a LAA to confirm the absence of visible ACM.

Has a visual marker layer been placed over areas where a concrete slab is not currently present?

Site inspections shall be conducted to confirm the marker layer has been placed across the areas of the site that are not currently covered in concrete, with photographs to be taken as evidence. The lateral extent of the marker layer shall also be surveyed by the Registered Surveyor to demonstrate placement of the marker layer consistent with requirements this RAP.

Has the visual marker layer been capped with at least 0.5m of imported material classified as VENM, or other equally suitable material?

Survey plans, as prepared by a Registered Surveyor, of the surface levels across the site prior to remediation works shall be compared to the surface levels following placement of all capping layers to confirm that the site has been covered in at least 0.5m of VENM, or other suitable materials (validated as per **Section 7.5**).

Has the surface of the capping layer been finished with an impermeable surface or landscaping?

Site inspections shall be conducted to confirm the surfaces have been finished with an impermeable surface or appropriate landscaping, with photographs to be taken as evidence.

Has a Long Term Environmental Management Plan been prepared?

A suitable LTEMP shall be prepared for the site to address the presence of asbestos within inaccessible soils. The LTEMP will detail the management strategies required to ensure the residual asbestos contamination at the site continues to not pose a health risk to future site users.

7.2.6 Specify Limits of Decision Error

A qualitative assessment shall be undertaken of potential decision errors associated with the data, in accordance with the provisions in NEPC 2013.

7.2.7 Optimize the Design for Obtaining Data

The validation sampling design for each specific type of validation works anticipated is discussed in detail in **Section 7.3**. The general sampling methodologies are discussed below.

7.2.8 Soil Sampling Methodology

No soil sampling is proposed, however, the remediation consultant will be required to complete soil sampling at other premises to enable importation of VENM, or other suitable material. In these instances, the soil sampling method, if required, shall be determined by the remediation consultant at the time, as consistent with the observations of subject materials appropriate to generate representative samples.

7.2.8.1 Soil Sample Containers

During the collection of soil samples, features such as seepage, discolouration, staining, odours and other indications of contamination shall be noted on field reporting sheets / field logs.

Collected soil samples shall be immediately transferred to sample containers of appropriate composition (glass jars) fitted with Teflon sealed lids for chemical analysis.

Minimum 500 mL samples shall be collected and placed in new zip lock bags where asbestos analysis is required.

Sample labels shall record sample identification number and date and time of sampling. Sample containers shall be transferred to a chilled ice box for sample preservation prior to and during shipment to the testing laboratory. A chain-of-custody form shall be completed and forwarded with the samples to the testing laboratory.

7.3 Validation Inspections

7.3.1 Existing Surface Clearance and Marker Layer Placement

Visual inspection will be undertaken by the remediation consultant to verify that the marker layer is placed across areas of the site that are not currently covered in concrete.

Where the existing slab is proposed to be removed, either for off-site disposal or for potential on-site re-use, a suitably qualified and experienced contaminated land consultant shall inspect the slab (prior to and following removal) to confirm the absence of any gross or widespread indicators of contamination, inclusive of asbestos, staining, or odours, prior to on-site re-use or off-site disposal.

Photographic records of the marker layer installation and details to the vertical and lateral extents of remediation, will be retained for inclusion in the LTEMP.

7.3.2 Capping Layer Validation

The following set of survey plans are required to validate placement of the capping layer:

- A 'pre-remediation site level survey' – on completion of the visual ACM clearance, the site levels and proposed pile foundation locations areas shall be surveyed and photographed prior to the commencement of remediation, with the lateral extent of the concrete slab included in the survey;
- A 'post-marker layer placement survey' – with levels across the site surveyed and photographed following placement of the marker layer (where required);
- The 'post-capping soil placement survey' – with levels surveyed across the site and photographed following placement of the VENM⁴ layer to the required construction level; and
- The 'post-surfacing' survey - with site levels surveyed and photographed following completion of the finished ground surface for the new development.

⁴ Or other suitable material that has been validated as per the requirements of **Section 7.5**.

The capping layer thickness for the site can be confirmed through comparison of surface levels recorded before and after placement of VENM⁵ layer, and will form part of the validation of remediation works. The specific details of the capping layer also require inclusion in the LTEMP (**Section 7.6.3**).

Photographic records of the capping layer installation and details regarding approximate lateral and vertical extents, will be retained for inclusion in the LTEMP.

7.4 Waste Disposal Off-site

No off-site disposal of waste is proposed as part of the capping layer installation. However should off-site waste disposal become necessary this will be managed as an unexpected find in accordance with **Section 9**.

7.5 Validation of Imported Materials

As discussed in **Section 7.2** where possible any fill material to be imported onto site will meet the definition of VENM, ENM or other suitable material. Materials imported as a growing medium in landscaped areas must be assessed against health-based and ecological criteria applicable to commercial/industrial and recreation C (where applicable) landuse as per NEPC (2013). The sampling requirements for these materials, prior to receipt on site is as follows:

- Sampling of VENM to be imported will be undertaken at the source site at a minimum rate of one sample per 500 m³, with a minimum of 3 and a maximum of 10 samples. Soil samples will be analysed prior to arrival on site for a range of source-specific analytes, including, but not limited to, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), heavy metals, organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs) and asbestos (NEPM 500 mL). Analytical results should be in accordance with site suitability criteria. In addition, material proposed to be imported to the site as VENM is required to meet the definition of VENM as defined in the *Protection of the Environment Operations Act* (1997) Schedule 1;
- Sampling ENM to be imported will be undertake at the source site in accordance with the NSW EPA (2014) excavated natural material order, with the addition of asbestos (NEPM 500 mL) sampled at half the ENM order density.
- Sampling of resource recovery orders and resource recovery exempt materials to be imported will be undertake at the source site at a minimum rate of one sample per 400 tonnes, with a minimum of 3 samples. Soil samples will be analysed prior to arrival on site for a range of source-specific analytes, including, but not limited to, TRH, BTEX, PAHs, heavy metals, OCPs, PCBs and asbestos (NEPM 500 mL). Analytical results should be in accordance with site suitability criteria and the requirements of the specific RRO/RRE.

The materials tracking requirements for these materials on site is as follows:

- Appropriate product documentation shall be provided prior to arrival on site to confirm the material is likely to be suitable, and prior to placement on the site the product shall be sampled as per the above.
- The product documentation provided by the supplier must be specific to the actual stockpile/material imported and not the results of general process/batch testing. If this cannot be provided by the supplier then the Environmental Consultant shall sample the material on arrival at site (and prior to placement).

⁵ Or other suitable material that has been validated as per the requirements of **Section 7.5**.

- The soil samples collected prior to placement will be analysed prior for a range of source-specific analytes, including, but not limited to, TRH, BTEX, PAHs, heavy metals, OCPs, PCBs and asbestos. Analytical results should be below the LOR or within published background levels (for heavy metals) for the material to be used at the site.
- At the time of arrival the imported material shall be tracked by record of the following details for inclusion in the final validation report:
 - Date (yyyy/mm/dd);
 - Source site details including reference to the relevant product specification sheets, and samples collected prior to placement;
 - Unique material load identification code (starting at 001);
 - Estimated volume (cubic metres);
 - Type of material;
 - Confirmation that each load of the material is free from visual and olfactory indicators of contamination including anthropogenic inclusions and/or construction waste;
 - Confirmation that the material is consistent with expectations based on the source site; and
 - Site figure showing placement location, date of placement and likely final depth below finished ground level (approximate).

7.6 Reporting

7.6.1 Existing Surface Clearance Report

Following the successful completion of the existing surface clearance inspection, the inspecting LAA shall prepare a ground surface asbestos clearance letter for the site. The clearance shall detail:

- The date/s of the clearance;
- Details of the inspecting LAA;
- The clearance inspection methodology; and
- Results of the clearance inspection.

7.6.2 Remedial Works Summary Report

At the completion of the remedial works program, the remediation consultant shall prepare a validation assessment report. The validation assessment report shall detail, but will not be limited to:

- The completed remedial works at the site;
- LAA details;
- Details of final site condition and assessment of survey plans as described in **Section 7.3.2**;
- Details of VENM or other materials (validated as per **Section 7.5** requirements) that were imported onto site to achieve the required ground levels for the new development; and
- A statement discussing whether the requirements of this RAP were successfully implemented.

In addition to the above, the validation assessment report shall be consistent with the requirements of NSW EPA (2020) 'Contaminated Land Guidelines, Consultants Reporting on Contaminated Land'.

7.6.3 Long Term Environmental Management Plan (LTEMP)

On completion of the validation report an LTEMP will be required for the site. The information required in the LTEMP is discussed in **Section 8**.

8. Long Term Site Management

While the proposed remediation works will render all asbestos at the site to be inaccessible, long term management of the capping layers will be required to ensure the residual asbestos continues to not pose a health risk to future site users. Furthermore, due to the limited intrusive soil sampling historically completed at the site, there is the potential for unknown impacts to be encountered during potential future works. The proposed LTEMP should include management controls to address the uncertainty regarding potential unidentified impacts. An LTEMP is required to document these management measures, and is required to document the following elements:

- A statement of the objectives of the LTEMP – i.e., to manage the remediated form of the site and to ensure no disturbance of the capping layer occurs. The LTEMP will also provide controls to manage unavoidable disturbances to the cap.
- Identification of residual asbestos presence at the site that require ongoing management/monitoring to meet the LTEMP objectives, including the type of contamination and location within the site.
- Identification where foundations have penetrated the capping layers as part of new building construction.
- Documentation of asbestos management measures which have been implemented to address the identified asbestos issues at the site.
- Description of management controls to limit the exposure of site users to known areas of asbestos contamination to acceptable levels.
- Description of responsibilities for implementing various elements of the provisions contained in the LTEMP.
- Timeframes for implementing the various control/monitoring , etc. elements outlined in the LTEMP.
- Asbestos management, monitoring and reporting requirements (if required) for the future disturbance of asbestos impact underlying the marker layer including:
 - Appropriate monitoring locations relating to any residual contamination;
 - Relevant assessment criteria to be used in evaluating monitoring results;
 - Frequency of monitoring and reporting;
 - Process for reviewing monitoring data and how decisions will be made regarding the ongoing management strategy;
 - The length of time for which monitoring is expected to continue; and
 - Reinstatement requirements to maintain the integrity of the capping layers.
- Health and safety requirements for particular activities.
- A program of review and audits, including requirements for inspections, maintenance and repair of the cap and groundwater abstraction exclusion.
- The provisions in the LTEMP are feasible (i.e., able to be implemented) and able to be legally enforceable (i.e., a mechanism exists, such as a public positive covenant registered under section 88E of the Conveyancing Act 1919 on the title of the site, to give the plan a basis in law).
- Corrective action procedures to be implemented where LTEMP requirements are breached.

The Auditor will require evidence that the party responsible for implementing the LTEMP understand and accept their responsibilities under the LTEMP and that the LTEMP is incorporated into the site's environmental management system.

9. Contingency Plan

A review of remediation works has been undertaken to identify potential risks to meeting the required site conditions following remediation and management of the identified asbestos hazards. A number of potential risks have been identified. These are listed in the sections following with contingencies that will be implemented to ensure that validation criteria are met.

9.1 Unexpected Finds Protocol

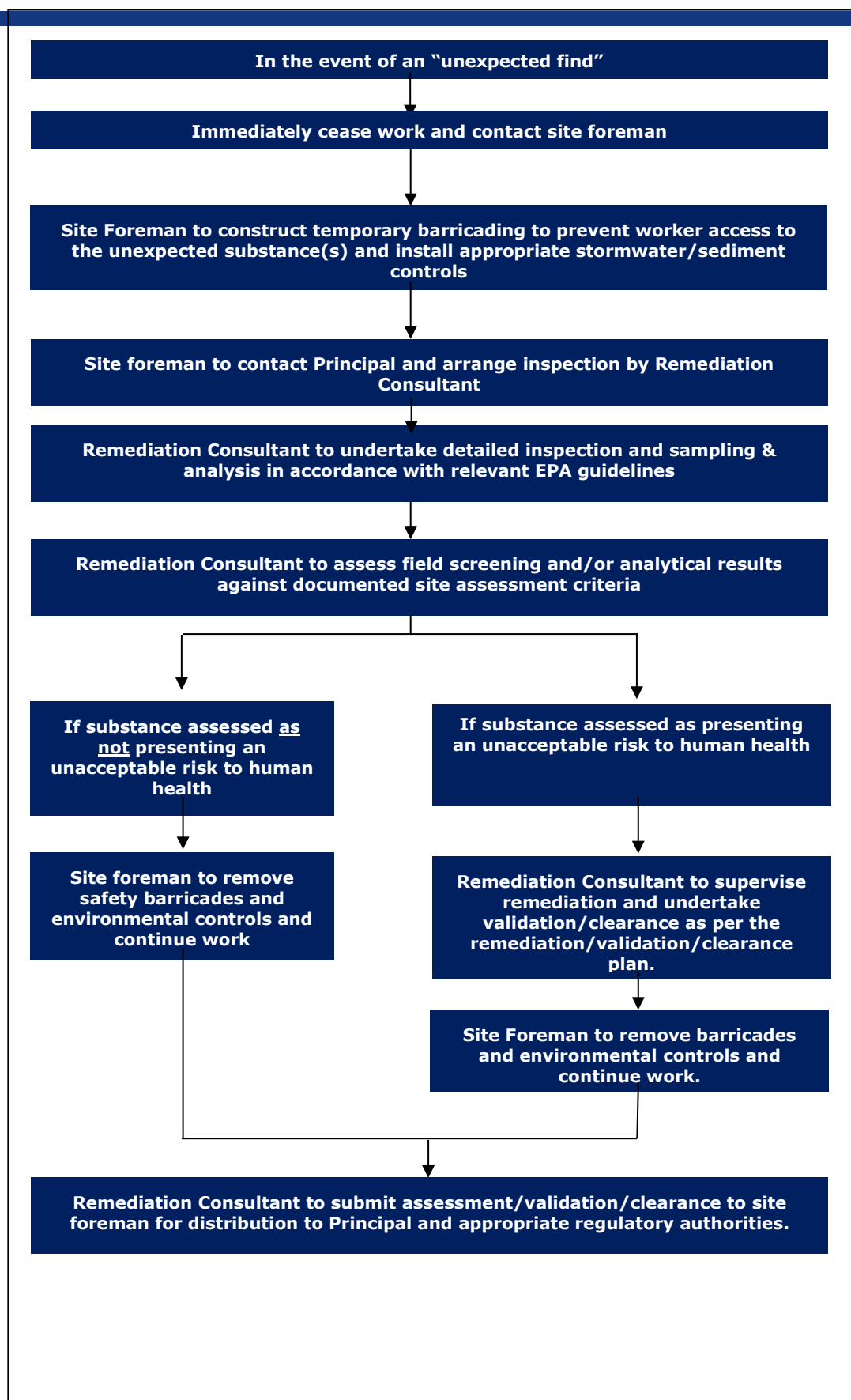
It is acknowledged that previous investigations of the site have been undertaken to assess the presence of asbestos hazards in at the site. However, ground conditions between sampling points may vary, and further hazards may arise from unexpected sources and/or in unexpected locations during remediation. The nature of any residual hazards which may be present at the site are likely to be detectable through visual or olfactory means and may include:

- Large quantities of ACM fragments encountered in the subsurface fill that was previously unidentified;
- Friable asbestos such as lagging (visible) encountered in the subsurface fill that was previously unidentified;
- bottles / containers of chemicals (visible);
- construction / demolition waste (visible);
- ash and/or slag contaminated soils / fill materials (visible);
- petroleum contaminated soils (odorous, staining / discolouration visible) beyond the identified impact, or at levels that prevent off-site disposal without treatment; and
- volatile organic compound contaminated soils (odorous).

As a precautionary measure to ensure the protection of the workforce and surrounding community, should any of the abovementioned substances be identified (or any other unexpected potentially hazardous substance), the procedure summarised in **Flowchart 9.1** is to be followed.

An enlarged version of the unexpected finds protocol, suitable for use on-site, should be posted in the Site Office and referred to during the daily tool box meetings as required.

Flowchart 9.1 – Unexpected Finds Protocol



9.2 Contingency Scenarios

9.3 Remedial Strategy Constraints

In the event that the proposed remedial works are found not to appropriately remove the identified asbestos hazards from accessible soil locations, or if the selected remedial strategy is not able to proceed, the following actions will be considered to ensure, firstly, the safety and health of people and the environment and, secondly, that the overall project objective of successfully implementing RAP is achieved.

9.3.1 Material Storage Breach

In the event any capped materials escape (or have the potential to escape), then the management controls shall be rectified and investigations undertaken to review the adequacy of the controls and any improvements implemented. Given the current approach is to contain only asbestos-impacted material, which is immobile in the subsurface, a breach of containment is considered unlikely.

9.3.2 Lack of Available Space

It is unlikely that the proposed remedial works would be hindered by available temporary storage space for excavated materials. However, in the event that temporary storage of excavated materials becomes difficult, works should cease until an appropriate management plan can be developed to appropriately manage and store excavated materials safely until such time as they can be appropriately disposed off site.

Any wastes requiring off-site disposal must be classified in accordance with *Waste Classification Guidelines* (NSW EPA 2014). The Site Owner or party completing the works is responsible for the lawful disposal of the classified waste to a licensed waste disposal facility lawfully able to accept the waste.

Disposal docket for each individual off-site waste disposal load must be provided to the Validation Consultant by the Principal Contractor to demonstrate appropriate off-site disposal of waste occurred. The Site Owner or party completing the works must advise the Consultant of the disposal facilities for all waste loads prior to removal.

9.3.3 Severe Weather

Weather will be monitored on a daily basis via checking an internet based weather service provider. Should severe weather be forecast, especially strong winds, works will stop until safe to re-commence. All site management controls will be implemented to the extent practicable as outlined in **Section 10** prior to any severe weather events.

9.3.4 Odours from Works

Based on the nature of the identified contaminants, off-site odour complaints are considered unlikely. Where complaints occur, the following will be undertaken:

- Installation of an odour screening / masking system at the remediation area boundaries; and/or
- Disturbance of soils during meteorologically favourable periods only; and/or
- The use of odour suppressant additives to water used to keep impact soils/ stockpiles moist; and/or
- Covering of impacted soils.

10. Site Management Plan

The site management plan is largely based on the City of Parramatta Council's *Contaminated Land Policy* and other relevant policies and guidelines. This section contains procedures and requirements that are to be implemented as a minimum requirement during the remedial works at the site.

10.1 Hours of Operation

City of Parramatta Council permits remediation works to be conducted at the following times:

- Monday to Saturday: 7am to 6pm; and
- Sunday and public holidays: No work permitted.

10.2 Soil and Water Management

The NSW Department of Housing Blue Book *Managing Urban Stormwater - Soil and Conservation- August 1998* outlines the general requirements for the preparation of a soil and water management plan. All remediation works shall be conducted in accordance with a soil and water management plan. A copy of the plan shall be kept on-site and made available to Council Officers on request. All erosion and sediment measures must be maintained in a functional condition throughout the remediation works.

Additional soil and sediment controls for development sites are found in the Parramatta Development Control Plan (2011)⁶.

10.3 Stockpile Management

All materials stockpiled on-site will be managed by the Principal Contractor for the duration of the remediation works. The following procedures will be implemented by the Site Owner or party completing the works:

- No stockpiles of soil or other materials shall be placed on footpaths or nature strips unless prior Council approval has been obtained.
- All stockpiles of soil or other materials shall be placed away from drainage lines, gutters or stormwater pits or inlets.
- All stockpiles of soil or other materials likely to generate dust or odours shall be covered (where practical).
- All stockpiles of contaminated soil shall be stored in a secure area and be covered if remaining more than 24 hours (where practical).

10.4 Site Access

Vehicle access to the site shall be stabilised to prevent the tracking of sediment onto the roads and footpath. Soil, earth, mud or similar materials must be removed from the roadway by sweeping, shovelling, or a means other than washing, on a daily basis or as required. Soil washings from wheels shall be collected and disposed of in a manner that does not pollute waters

10.5 Excavation Pump-out

As all proposed remediation works will take place above the existing ground level no excavation pump is anticipated as part of the proposed remediation.

⁶ *Parramatta Development Control Plan*, City of Parramatta Council, October 2011 (City of Parramatta Council 2011).

10.6 Landscaping / Rehabilitation

Once sufficient imported VENM has been placed to achieve the required design levels then all exposed soil on the site surface shall be progressively covered in the appropriate surface finishes approved in the project development consent. Primarily this will be in the form of concrete slabs, however some small areas will also be finished with landscaped vegetation at the surface.

10.7 Noise

Category 2 remediation work shall comply with the Department of Environment & Climate Change (now NSW EPA) *Interim Construction Noise Guideline* (2009) for the management and control of construction site noise.

10.8 Vibration

The use of plant and machinery for the remediation works shall not cause vibrations to be felt or capable to be measured at any premises in proximity of the site.

10.9 Air Quality

During remedial works, dust emissions and any odours will be confined within the site boundary, and mitigation of dust and odour emissions should be attempted. This will require as a minimum:

- Wetting down of stockpiled VENM using a water spray to minimise the potential for dust to be generated.
- Meteorological conditions will be monitored by the Principal Contractor. Remedial work will be stopped or modified where meteorological conditions are adverse (i.e. dry conditions and strong winds towards sensitive receptors).
- No odours should be detectable at the site boundary and volatile emissions of other potentially volatile substances shall be controlled. Appropriate actions will be taken by the Principal Contractor to reduce the odours, which may include: increasing the amount of covering of stockpiles; mist sprays; odour suppressants; and maintenance of equipment.
- Records of volatile emissions and odours shall be kept by the Principal Contractor. Equipment and machinery will be adequately maintained to minimise exhaust emissions. No materials shall be burnt on the site.

As remediation works have the potential to generate dust emissions and given that proposed remediation works will generally take place above the existing sealed site surface, there is low potential for asbestos impacted dust. However, if site soils are disturbed, airborne asbestos fibre monitoring is required. The CEMP should include parameters that would trigger the requirement to undertake airborne asbestos fibre monitoring and:

- Appropriate monitoring locations;
- Relevant assessment criteria to be used in evaluating monitoring results;
- Frequency of monitoring and reporting; and
- Process for reviewing monitoring data and how decisions will be made regarding the duration of monitoring required.

Airborne asbestos fibre monitoring will need to be conducted by the remediation consultant that is also a SafeWork NSW (or equivalent) 'Competent Person' in accordance with the requirements of the National Occupational Health and Safety Commission (NOHSC) *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres – 2nd Edition* [NOHSC 3002:2005].

10.10 Transport of Material Offsite

Trucks will be unloaded in designated areas. The Contractor shall ensure that there is no material tracked out onto the street and that the load is securely covered. In addition, all site vehicles must leave the site in a forward direction.

The Contractor shall also log truck movements and approximate volume, via registration number and consignment number (where applicable), into and out of the site.

All appropriate road rules shall be observed and state roads will be selected as far as practicable over local roads when deciding on the transport route to the off-site material disposal location.

Deliveries of soil, materials, equipment or machinery must occur during the hours of remediation work identified in **Section 10.1**.

Plant and vehicles should limit their speed when working within asbestos exclusion zones and only traverse wetted haul roads.

10.11 Hazardous Materials

Hazardous and / or intractable wastes are not anticipated to be generated from the remediation works, however should this circumstance arise it will be treated as an unexpected find (**Section 9.1**) and shall be removed and disposed of in accordance with the requirements of NSW EPA, SafeWork NSW and the relevant regulations by the Party Responsible for completing the works. In particular, any hazardous wastes will be transported by a NSW EPA licensed transporter.

10.12 Imported Fill

Any materials imported on site by the Contractor to re-establish ground levels or to be applied as a capping layer must be validated as environmentally suitable material (i.e., VENM, ENM or other, as described in **Section 7.3**). Additionally, the imported fill should also be compatible with required geotechnical constraints and the existing soils characteristic for site drainage purposes.

10.13 Groundwater

It is anticipated no dewatering will be required for the remediation works given the stockpiled waste sits above ground level, however, should dewatering become necessary as part of the remediation works, a licence shall be applied for from the Department of Primary Industries for approval to extract groundwater.

10.14 Site Signage and Contact Numbers

A sign/s shall be displayed adjacent to the site access point/s throughout the duration of the works with the contact details of the remediation contractor and project manager as provided and maintained by the remediation contractor.

10.15 Site Security

The remedial areas shall be secured against unauthorised access by means of an appropriate fence or barricade by the remediation contractor. All persons working in asbestos remedial areas must be inducted, have undertaken required training and have on appropriate PPE. The access gates will be locked at all times when remedial works are not occurring.

10.16 Community Consultation

The client will be responsible for any community consultation that may be required in relation to the remediation works.

11. Health and Safety Management Plan

11.1 Overview

This health and safety plan contains procedures and requirements that are to be implemented as a minimum during the remediation works.

The objectives of the health and safety plan are:

- To apply standard procedures that reduce risks to acceptable levels resulting from the remedial works.
- To ensure all employees are provided with appropriate training, equipment and support to consistently perform their duties in a safe manner; and
- To have procedures to protect other site workers and the general public.

These objectives will be achieved by:

- Assignment of responsibilities;
- An evaluation of hazards;
- Establishment of personal protection standards and mandatory safety practices and procedures; and
- Provision for contingencies that may arise while operations are being conducted at the site.

This health and safety plan does not provide safety information specific to construction and other demolition or excavation activities carried out by contractors, such as the safe operation, maintenance and inspection of plant, etc. Contractors will be required to prepare their own Safe Work Method Statements for their work activities. All parties working on the site shall comply with all applicable Health and Safety legislation, regulations, codes and guidelines.

11.2 Responsibilities

Further to the definitions of remediation roles and responsibilities presented in Section 6.2 the following responsibilities will apply with respect to Health and Safety Management during remediation works.

Principal Contractor

The Principal Contractor is responsible for ensuring that the work is carried out in accordance with the health and safety plan. This will include:

- Ensuring a copy of the health and safety plan is available at the site during the remediation/validation activities;
- Confirming individuals are competent in performing allotted tasks;
- Liaison with the contractor representatives, as appropriate, regarding safety matters; and
- Investigation and reporting of incidents and accidents.

Other Members of the Site Workforce

Every individual worker is responsible for conducting their allocated tasks in a safe manner and in accordance with their training and experience. They must give due consideration to the safety of all others in their proximity and cooperate in matters of health and safety. All workers must leave their work areas in such a condition that the location will not be hazardous to others at any time.

11.3 Hazards

The known or potential hazards associated with the remedial work activities are listed below:

- inhalation hazards associated with the presence of asbestos.
- physical hazards, including:
 - work in or near excavations;
 - operating machinery;
 - heat stress and UV exposure;
 - underground or overhead services;
 - manual handling;
 - fauna; and
 - noise.

In the event of the discovery of any condition that would suggest the existence of a situation more hazardous than anticipated, or of any new hazard that could potentially cause serious harm to personnel or the environment, work will be suspended until the client, Principal Contractor and Environmental Consultant have been notified and appropriate instructions have been provided to field personnel.

11.3.1 Inhalation Hazards

The main inhalation hazards from the remediation and management works are consequent of the presence of asbestos, however these are essentially mitigated by the presence of an existing sealed surface. As such the Health and Safety Plan will only require the inclusions of measures to be put in place in the event that the existing surface cover is breached as described in the environmental controls for the works. Where there is a breach of the site surface and potential exists for airborne emissions to be generated, PPE shall be required to be worn to prevent potential exposure, as described in **Section 11.4.2**.

11.3.2 Physical Hazards

Operating Machinery

Heavy plant and equipment operating in the vicinity of field personnel presents a risk of physical injury. Personnel should be cognisant of their position in relation to operating machinery at all times.

Never walk behind or to the side of any operating equipment without the operator's knowledge. Do not assume that the operator knows your position. Personnel should stay at least 1 m from the operational area of heavy equipment and should not stand directly below any load or piece of equipment (e.g. excavators).

All persons on-site are to wear high-visibility upper body clothing at all times.

Work In or Near Excavations

No deep excavations are anticipated for the remedial works. All excavations greater than 1.5m in depth shall be shored, sloped or otherwise constructed so as to minimise the potential for collapse.

Cuts and Abrasions

The manual work associated with the remediation works may give rise to the risk of cuts and abrasions to personnel working in the area. As well as the direct consequences of any cut or abrasion, such injuries can lead to the possibility of exposure to contaminants through the wound as well as diseases such as tetanus. To minimise the risk of direct or indirect injury, personnel will wear the personal protective equipment (PPE) described in **Section 11.4.1**.

Heat Stress and UV Exposure

Site personnel may experience heat stress due to a combination of elevated ambient temperatures and the concurrent use of personal protection equipment; this depends in part on the type of work and the time of year.

In addition to heat stress, overexposure to UV radiation in sunlight can result in sunburn to exposed skin. The use of a high protection sunscreen (SPF30+ or greater) on all exposed skin is recommended. Sunscreen should be applied at least 20 minutes prior to the commencement of work and re-applied at least every two hours or more frequently if perspiring.

Hats (including hard hats in specified areas) will also provide additional sun protection during the peak (i.e. 10:00 am to 3:00 PM) sun period. Sunglasses should be worn (where appropriate) to protect eyes from effects of UV exposure.

Underground Services

There is the potential for underground services (electricity, natural gas lines, water, telephone, sewer, and stormwater) to be present beneath the work area. The remediation contractor shall ensure that appropriate procedures will be taken to minimise the risk associated with excavation near services.

Aboveground Electrical Hazards

All electrical plant and equipment must comply with the requirements of Australian Standard AS 3000. Hand held portable tools shall comply with AS/NZS 3160 "*hand-held portable electric tools*" and shall be double insulated. Cord connected portable hand lamps shall comply with AS/NZS 3118. A Residual Current Device (RCD) shall protect plug-in portable equipment, which is connected to a supply above Extra Low Voltage - 12-24volts (including equipment supplied from a generator or welding set). RCD protection shall be provided during maintenance of portable electrical equipment at all times while the equipment is connected to a power supply above Extra Low Voltage, irrespective of whether power is switched ON or OFF. RCD's shall comply with AS 3190 and shall be type II units, rated to trip at or below 30 milliamps within 40 milliseconds.

No excavator, drill rig or crane may work within 6 m of overhead distribution power lines.

Manual Handling

When lifting or handling heavy objects, use correct lifting techniques, bending the knees not the back. If the item to be lifted is too heavy or awkward for one person to lift, seek assistance from other company employees or use mechanical help.

Fauna

The remedial works are within an area of land with trees and grasses, and it is likely that there will be potentially hazardous invertebrate and vertebrate fauna, including but not limited to snakes, lizards, birds, spiders, bees, wasps and ants. Long sleeve shirts, pants and boots should be worn at all times on the site. If snakes are identified on the site during remedial works, an appropriate snake removal service should be contacted to relocate the animal away from the work area.

11.4 Personal Protective Equipment (PPE)

11.4.1 General Site Works PPE

All workers who may come into direct contact with contaminated soil will wear the following personal protective equipment:

- High visibility long sleeved collared shirt;
- Long pants;
- Heavy duty outer gloves (e.g. leather) where there is a risk of cuts or abrasions, otherwise PVC outer gloves if in direct contact with contaminated soil;
- Steel capped boots;
- Safety glasses;

- High visibility vest or jacket (not required if shirt is high-visibility); and
- Hard hat when working near mechanical plant.

11.4.2 PPE During Cutting of Existing Slab and Installation of Pile Foundations

Asbestos-containing materials are present, and friable asbestos is potentially also present, in soil underlying the pavement. As such the works undertaken to cut the existing ground slab and install pile foundations will need to be undertaken as per the requirements of the CEMP for the site, as follows:

- Work involving any breaches of the pavement or capping and temporary marker layer, (i.e. deep intrusive works exceeding a depth of 0.3 m) will require supervision by a Class A licensed asbestos contractor. The works will be undertaken using the procedures described in the *SafeWork NSW Code of Practice How To Safely Remove Asbestos (SafeWork NSW 2022a)* and site-specific procedures.
- All site workers shall be inducted to the site and made aware of the procedures outlined in the project CAMP and CEMP.
- Workers and visitors to the site area will be made aware of the friable asbestos contamination during site inductions and tool box meetings and only authorised people shall enter the work area, which must contain a perimeter barrier to restrict entry.
- An asbestos work area shall be defined and clearly marked for the full extent of the concrete cutting / pile installation works.
- All personnel working within the asbestos work area shall wear P2 (or higher) class half face respirators, disposable gloves and coveralls made from materials which provide adequate protection against fibre penetration whilst completing works and whilst within the asbestos work area.
- A 5 m wide exclusion zone shall be established around the perimeter of the asbestos work area. The dimensions of the exclusion zone may be varied by the person/s with management or control of the workplace, or by the Class A licensed asbestos contractor.
- Asbestos warning signs shall be placed surrounding the asbestos work area and at entry/egress points.
- A decontamination area shall be marked out within the asbestos work area for the removal and disposal of PPE before site workers leave the asbestos work area. Personal decontamination must be undertaken each time a site worker leaves the asbestos works area and at the completion of the works. All disposable PPE shall be disposed of as asbestos waste.
- Static air monitoring at a minimum of four locations surrounding each asbestos work area and with consideration to neighbouring receptors shall be undertaken in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition* [NOHSC: 3003(2005)] for the duration of the work. The monitoring locations shall be assigned by a Licensed Asbestos Assessor (LAA).
- At the completion of the works the capping and marker layer are to be re-instated in accordance with the requirements of this RAP. The changes should be detailed in the register of site works.

11.4.3 PPE in Other Areas of Asbestos Disturbance (If Required)

During any other asbestos remediation/management works, excavation, transport or placement asbestos impacted materials, the following items of PPE are required in addition to any standard PPE required for the specific task, and applies for any ground workers within the asbestos work zone:

- Disposable coveralls must be worn (Type 5, Category 3 or better);

- Disposable gloves – non disposable gloves must be cleaned within the decontamination unit in accordance with SafeWork NSW (2022a);
- P2 class respirator or higher – non disposable respirators must be cleaned in the decontamination area in accordance with SafeWork NSW (2022a); and
- Steel capped rubber soled work shoes (covered with booties) or gumboots.

Plant operators undertaking sub-surface intrusive works must close cabin doors and windows and set air conditioning to re circulate when operating within the asbestos work zone or wear PPE as listed above.

Further information on PPE requirements for asbestos removal works is provided in SafeWork NSW (2022a).

The contractor shall supply and keep in good order, two complete sets of protective clothing and respirators for authorised inspection personnel. These will remain the property of the contractor at the end of the contract.

Employees must receive instruction in the correct method of using the respirator and on the importance of correct facial fit and maintenance. No person with a beard shall be allowed within the asbestos work area except using an approved positive pressure continuous airflow hood.

It is further noted that, as part of the WorkCover permitting process, additional PPE may be required. If this occurs, then the above PPE requirements will be upgraded to reflect SafeWork NSW requirements.

11.5 Emergency Response

The remediation contractor will be responsible for preparing an emergency response plan, which will provide details on appropriate action and evacuation procedures in the event of an emergency.

In the event of an emergency arising on the site, appropriate action should be taken. Site evacuation procedures should be followed, as necessary.

In the event of an accident:

- evaluate the seriousness of the injury, and contact emergency services, if necessary;
- provide first aid, as appropriate;
- if working within a Decontamination Zone and it is safe to do so, evacuate the injured person via the Decontamination Zone; and
- make the area as safe as possible without jeopardising safety.

If a serious accident occurs, do not disturb the scene, except to make safe and prevent further injury or damage, and keep all unauthorised people out, and report all accidents to the Project Manager and relevant emergency services and authorities.

12. Regulatory Approvals / Licensing

12.1 SEPP (Resilience and Hazards) 2021

The requirements of SEPP (Resilience and Hazards) 2021 were considered in the EIS for the approved development and as a result the remediation works do not require specific consent beyond that already received from the NSW Department of Planning (**Section 2.3**).

The remediation works are considered to comprise Category 2 works.

12.2 Protection of the Environment Operations Act 1997

The proposed asbestos remediation/management activities are not required to be licensed under the *Protection of the Environment Operation Act 1997* since the works do not involve:

- treatment otherwise than by incineration and storage of more than 30 000 cubic metres of contaminated soil originating exclusively from the site; or
- disturbance of more than an aggregate area of 3 hectares of contaminated soil originating exclusively from the site.

12.3 Protection of The Environment Operations (Waste) Regulation 2014

The regulations make requirements relating to non-licensed waste activities and waste transporting. The proposed works on the site will not require to be licensed.

It is noted that Section 42 of the Regulation stipulates special transportation, reporting, re-use and recycling requirements relating to asbestos waste and must be complied with regardless whether the activity is licensed. However given that transport of waste is not proposed as part of the remediation works the requirements of Section 42 of the Regulation do not apply.

12.4 Waste Classification Guidelines (NSW EPA 2014)

All wastes generated and proposed to be disposed off-site shall be assessed, classified and managed in accordance with this guideline. However given that off-site disposal of waste is not proposed as part of the remediation works the requirements of NSW EPA (2014) do not apply.

12.5 Asbestos Removal Regulations and Code of Practice

The relocation and/or capping works proposed shall be managed in accordance with the Work Health and Safety Act (2011) and Work Health and Safety Regulation (2017), *How to Manage and Control Asbestos in the Workplace: Code of Practice* (SafeWork NSW 2022a), *"How to Safely Remove Asbestos: Code of Practice* (SafeWork NSW 2022b), *Managing Asbestos in or on Soil* (WorkCover 2014). However no special precautions or requirements are considered necessary for compliance given that the detected asbestos (in **Section 3.4**) and will remain under a cap or sealed surface on the redeveloped site.

13. Conclusions and Recommendations

13.1 Conclusions

Overall, it is considered that the proposed actions outlined in this RAP conform to the requirements of the *Contaminated Sites Guidelines for the NSW Site Auditor Scheme (3rd Edition)* (NSW EPA 2017) because they are: technically feasible; environmentally justifiable; and consistent with relevant laws, policies and guidelines endorsed by NSW EPA.

Subject to the successful implementation of the measures described in this RAP and the limitations in **Section 14**, it is concluded that the identified asbestos contamination at the site can be remediated / managed in such a way to be appropriately protective of human health and the environment, such that the site can be made suitable for commercial land use.

13.2 Recommendations

It is recommended that the processes outlined in this RAP be implemented and that the following documentation be developed and implemented to ensure the risks and impacts during remediation works are controlled in an appropriate manner:

- An ASSMP is to be developed to manage identified PASS/ASS during construction/excavation activities;
- A construction environmental management plan (CEMP) and asbestos management plan (AMP), to document the monitoring and management measures required to control the environmental impacts of the works and ensure the validation protocols are being addressed; and
- An LTEMP for long-term site management of in situ asbestos.

Upon completion of the remediation works, the Validation Report is required to be prepared to verify remedial works were completed in accordance with the RAP.

14. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquiries.

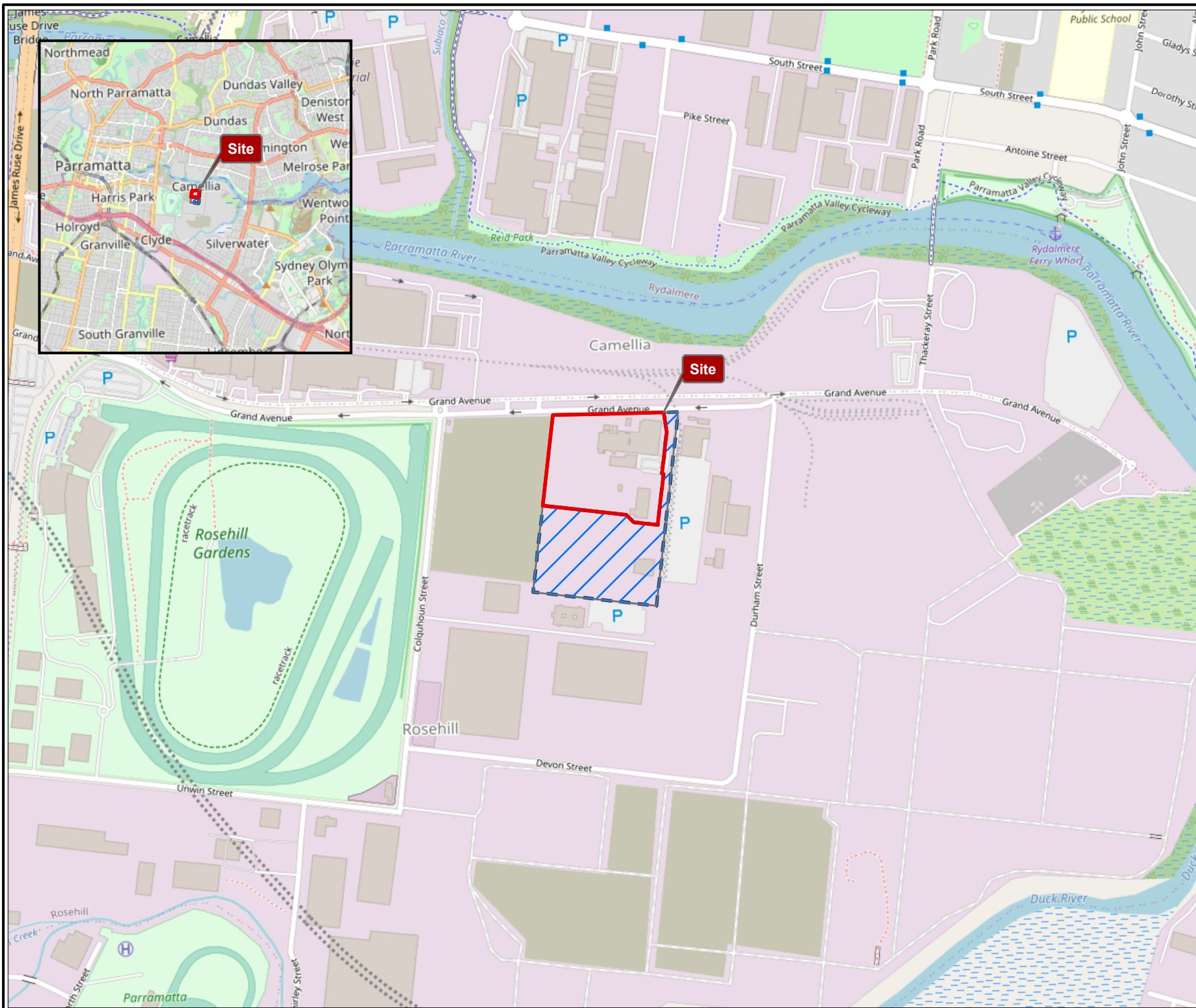
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Legend

- Approximate Site Boundary - Stage 2
- Stage 1 – Not Part of Current Investigation



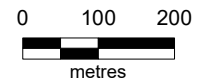
Job No: 61873

Client: Hale Capital Partners

Version: R02 Rev A Date 22/10/2021

Drawn By: JA Checked By: JZ

Scale 1:10,000



Coord. Sys. GDA 1994 MGA Zone 56

**6 Grand Avenue,
Rosehill, NSW**

SITE LOCATION

FIGURE 1



- Legend**
- Approximate Site Boundary - Stage 2
 - Stage 1 – Not Part of Current Investigation
 - NSW Cadastre (DFS, 2021)
 - Site Features



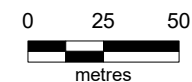
Job No: 61873

Client: Hale Capital Partners

Version: R02 Rev A Date 22/10/2021

Drawn By: JA Checked By: JZ

Scale 1:2,500



Coord. Sys. GDA 1994 MGA Zone 56

**6 Grand Avenue,
Rosehill, NSW**

SITE LAYOUT

FIGURE 2



Legend

- Approximate Site Boundary - Stage 2
- Stage 1 – Not Part of Current Investigation
- NSW Cadastre (DFS, 2021)

Historical Sample Locations - KPMG SGC (2016)

- Monitoring Well
- Monitoring Well - Lost
- Soil Borehole Location
- Soil Vapour Port Location

Sample Locations (JBS&G 2021)

- Monitoring Well
- Vapour Sampling Locations

Job No: 61873

Client: Hale Capital Partners

Version: R01 Rev A	Date 22/10/2021
Drawn By: JA	Checked By: JZ

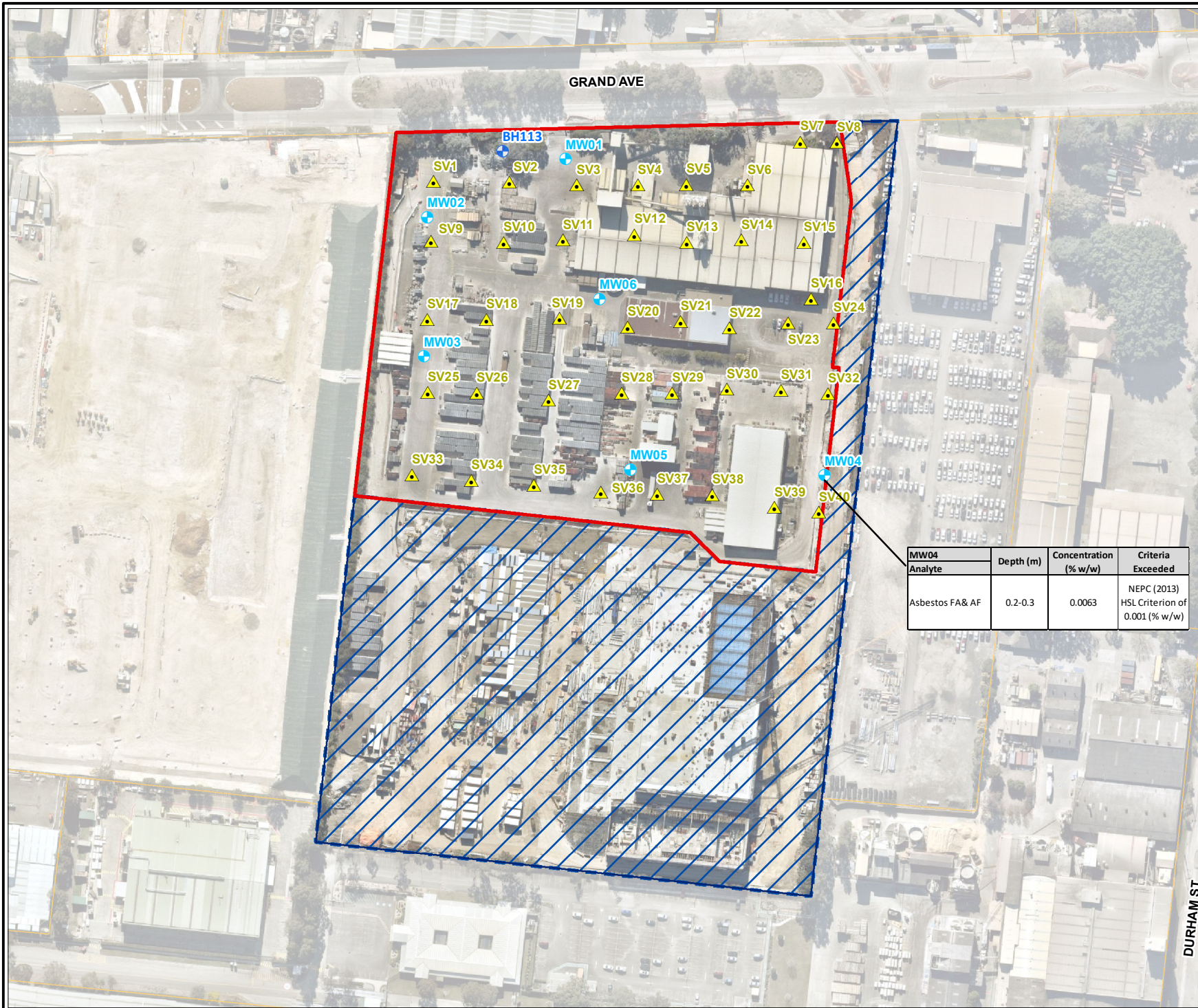
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Coord. Sys. GDA 1994 MGA Zone 56

**6 Grand Avenue,
Rosehill, NSW**

**CURRENT INVESTIGATION AND
HISTORICAL SAMPLE LOCATIONS**

FIGURE 3



- Legend**
- Approximate Site Boundary - Stage 2
 - Stage 1 – Not Part of Current Investigation
 - NSW Cadastre (DFS, 2021)
 - Sample Locations (JBS&G 2021)**
 - Monitoring Well (Existing)
 - Monitoring Well (New)
 - Vapour Sampling Locations

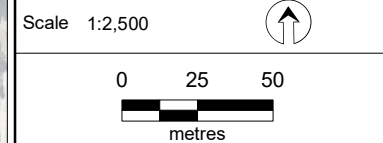


Job No: 61873

Client: Hale Capital Partners

Version: R01 Rev A Date 22/10/2021

Drawn By: JA/RH Checked By: JZ



Coord. Sys. GDA 1994 MGA Zone 56

6 Grand Avenue, Rosehill, NSW

**CURRENT INVESTIGATION
HEALTH EXCEEDANCES**

FIGURE 4

Appendix A Redevelopment Plans



AREA AND INFORMATION SCHEDULE	
SITE AREA	42, 375 SQM*
WAREHOUSE 1 OFFICE 1 (INC. DISPATCH)	3000 SQM* 300 SQM*
WAREHOUSE 2 OFFICE 2	3000 SQM* 300 SQM*
WAREHOUSE 3 OFFICE 3	3000 SQM* 300 SQM*
WAREHOUSE 4 OFFICE 4	3000 SQM* 300 SQM*
WAREHOUSE 5 OFFICE 5	3000 SQM* 300 SQM*
WAREHOUSE 6 OFFICE 6	3000 SQM* 300 SQM*
WAREHOUSE 7 OFFICE 7	3000 SQM* 300 SQM*
WAREHOUSE 8 OFFICE 8	3000 SQM* 300 SQM*
TOTAL BUILDING	26,400 SQM*
HARDSTAND AREA LANDSCAPED AREA 7.7% BITUMEN CARPARK AREA	5,963 SQM* 3,266 SQM* 8,778 SQM*
PROPOSED PARKING BAYS PROPOSED DISABLE BAYS REQUIRED PARKING (DCP)	300 CAR SPACES 8 CAR SPACES 308 CAR SPACES
SITE COVERAGE	62%*

*APPROX

5341m2 loading / 1 per 800m2 = 7 carparking bays

18659m2 industrial/ 1 per 70m2 = 267 carparking bays

2400m2 industrial/ 1 per 70m2 = 35carparking bays

1 Concept_Warehouse Building A OPTION 3
1 : 500

NOTE: THE LOCATION OF PROPERTY ALIGNMENTS IS DETERMINED FROM SURVEY INFORMATION PROVIDED BY SURVEYOR.
DO NOT SCALE THIS DRAWING. VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING ANY WORK. COPYRIGHT © THIS DRAWING REMAINS THE PROPERTY OF PACEARCHITECTS. REPRODUCTION IN WHOLE OR PART IS FORBIDDEN.

BUILDER / PROJECT MANAGER

CLIENT

REVISION	DESCRIPTION	DATE
A	DRAFT ISSUE FOR COMMENT	27.08.21
B	REVISED ISSUE	03.09.21

Rosehill Industrial
10 Grand Ave. Rosehill
Sydney

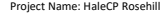
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purpose DA	project no 210825	
OPTION 3 - SITE PLAN	date 27 August 2021	
dwn	dwg no	issue
PGT	210825 - SK003	B

Appendix B Historical Investigations – Summary Tables of Soil and Vapour Analytical Results

Project Name: HaleCP Rosehill

[illegible]

Project Number: 61873
Project Name: HaleCP Rosehill

[illegible]

Project Number: 61873
Project Name: HaleCP Rosehill

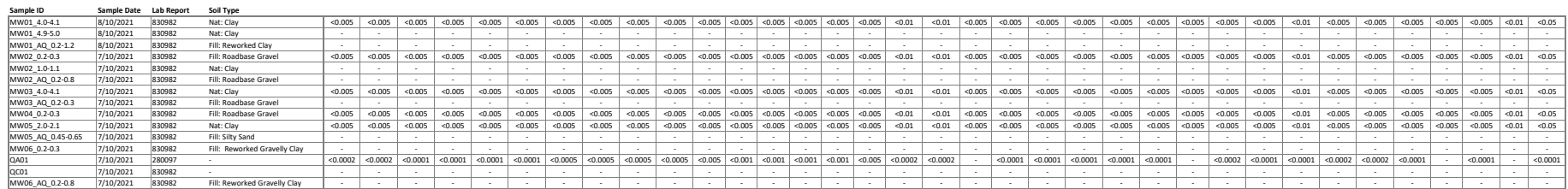


Table A3: Soil Asbestos Results

Project Number: 61873



				Asbestos										Comment
Sample ID	Sample Date	Lab Report	Soil Type	Approximate Sample Mass	Mass ACM	Mass Asbestos in ACM	Asbestos from ACM in Soil	Mass FA	Mass Asbestos in FA	Mass AF	Mass asbestos in AF	Asbestos from FA & AF in Soil	Mass Asbestos in FA & AF	
				g	g	g	% (w/w)	g	g	g	g	% (w/w)	g	
EQL														
NEPM 2013 Table 7 Comm/Ind D Soil HSL for Asbestos in Soil							0.05					0.001		
MW01_4.0-4.1	8/10/2021	830982	Nat: Clay	-	-	-	-	-	-	-	-	-	-	-
MW01_4.9-5.0	8/10/2021	830982	Nat: Clay	-	-	-	-	-	-	-	-	-	-	-
MW01_AQ_0.2-1.2	8/10/2021	830982	Fill: Reworked Clay	811	0	0	0	0	0	0	0	0	0	No asbestos or trace asbestos detected. Organic fibre detected.
MW02_0.2-0.3	7/10/2021	830982	Fill: Roadbase Gravel	-	-	-	-	-	-	-	-	-	-	-
MW02_1.0-1.1	7/10/2021	830982	Nat: Clay	-	-	-	-	-	-	-	-	-	-	-
MW02_AQ_0.2-0.8	7/10/2021	830982	Fill: Roadbase Gravel	913	0	0	0	0	0	0.0051	0.0046	0.0005	0.0046	Asbestos fines (chrysotile) detected as loose fibre bundle. No trace asbestos. Organic fibre detected.
MW03_4.0-4.1	7/10/2021	830982	Nat: Clay	-	-	-	-	-	-	-	-	-	-	-
MW03_AQ_0.2-0.3	7/10/2021	830982	Fill: Roadbase Gravel	803	0	0	0	0	0	0.003	0.0029	0.0004	0.0029	Asbestos fines (chrysotile) detected as loose fibre bundle. No trace asbestos. Organic fibre detected.
MW04_0.2-0.3	7/10/2021	830982	Fill: Roadbase Gravel	916	0	0	0	0	0	0.5798	0.058	0.0063	0.058	Friable asbestos cement (chrysotile and amosite) fragments detected. No trace asbestos. Organic fibre detected.
MW05_2.0-2.1	7/10/2021	830982	Nat: Clay	-	-	-	-	-	-	-	-	-	-	-
MW05_AQ_0.45-0.65	7/10/2021	830982	Fill: Silty Sand	699	0	0	0	0	0	0	0	0	0	No asbestos or trace asbestos detected. Organic fibre detected.
MW06_0.2-0.3	7/10/2021	830982	Fill: Reworked Gravelly Clay	-	-	-	-	-	-	-	-	-	-	-
QA01	7/10/2021	280097	-	-	-	-	-	-	-	-	-	-	-	-
QC01	7/10/2021	830982	-	-	-	-	-	-	-	-	-	-	-	-
MW06_AQ_0.2-0.8	7/10/2021	830982	Fill: Reworked Gravelly Clay	701	0	0	0	0	0	0	0	0	0	No asbestos or trace asbestos detected. Organic fibre detected.

Table C1: Field Measured Vapour Parameters - October 2021

Project Number: 61873

Project Name: 10 Grand Ave Rosehill



Sample Location	Sample Type	Date	Oxygen	CO2	PID	Methane	LEL
			%	%	ppm	%	%
SV01	Soil Vapour Pin	08-Oct-21	16.2	1.1	1.3	0	0
SV02	Soil Vapour Pin	08-Oct-21	16.7	0.0	1.3	0	0
SV03	Soil Vapour Pin	08-Oct-21	15.9	0.0	0	0	0
SV04	Soil Vapour Pin	08-Oct-21	15.8	0.0	0	0	0
SV05	Soil Vapour Pin	08-Oct-21	15.2	0.0	3.6	0	0
SV06	Soil Vapour Pin	08-Oct-21	16.3	0.0	2.1	0	0
SV07	Soil Vapour Pin	08-Oct-21	3.7	0.0	0.2	0	0
SV08	Soil Vapour Pin	08-Oct-21	2.3	0.0	0.3	0	0
SV09	Soil Vapour Pin	08-Oct-21	19.0	0.0	3	0	0
SV10	Soil Vapour Pin	08-Oct-21	16.0	0.0	3.1	0	0
SV11	Soil Vapour Pin	08-Oct-21	8.8	0.0	1.5	0	0
SV12	Soil Vapour Pin	08-Oct-21	16.7	0.0	0	0	0
SV13	Soil Vapour Pin	08-Oct-21	7.3	0.0	0	0	0
SV14	Soil Vapour Pin	08-Oct-21	9.6	0.4	2	0	0
SV15	Soil Vapour Pin	08-Oct-21	9.7	0.4	0	0	0
SV16	Soil Vapour Pin	06-Oct-21	0.3	15.0	1.5	0	0
SV17	Soil Vapour Pin	08-Oct-21	20.8	0.0	0.2	0	0
SV18	Soil Vapour Pin	08-Oct-21	16.3	0.0	9.2	0	0
SV19	Soil Vapour Pin	08-Oct-21	7.6	0.0	0	0	0
SV20	Soil Vapour Pin	08-Oct-21	13.5	0.0	0	0	0
SV21	Soil Vapour Pin	08-Oct-21	19.1	0.0	0	0	0
SV22	Soil Vapour Pin	06-Oct-21	18.2	2.1	3.2	0	0
SV23	Soil Vapour Pin	06-Oct-21	14.6	4.5	0.7	0	0
SV24	Soil Vapour Pin	06-Oct-21	6.2	13.3	1.4	0	0
SV25	Soil Vapour Pin	06-Oct-21	13.1	0.1	2.1	0	0
SV26	Soil Vapour Pin	06-Oct-21	16.6	2.5	5.5	0	0
SV27	Soil Vapour Pin	06-Oct-21	17.1	0.0	6.5	0	0
SV28	Soil Vapour Pin	06-Oct-21	20.9	0.0	0.7	0	0
SV29	Soil Vapour Pin	06-Oct-21	15.2	0.0	5.9	0	0
SV30	Soil Vapour Pin	06-Oct-21	8.6	0.0	14.7	0	0
SV31	Soil Vapour Pin	06-Oct-21	2.1	0.0	17.6	0	0
SV32	Soil Vapour Pin	06-Oct-21	20.2	0.5	0.7	0	0
SV33	Soil Vapour Pin	06-Oct-21	19.9	0.0	0.1	0	0
SV34	Soil Vapour Pin	06-Oct-21	19.5	0.3	6.3	0	0
SV35	Soil Vapour Pin	06-Oct-21	15.7	0.0	6.5	0	0
SV36	Soil Vapour Pin	06-Oct-21	7.5	0.0	9.9	0	0
SV37	Soil Vapour Pin	06-Oct-21	21.5	0.0	0.5	0	0
SV38	Soil Vapour Pin	06-Oct-21	19.3	0.0	16.7	0	0
SV39	Soil Vapour Pin	06-Oct-21	19.5	0.0	1.2	0	0
SV40	Soil Vapour Pin	06-Oct-21	20.6	0.3	0.9	0	0

Project Number: 61873

[illegible][illegible]

Project Number: 61873

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Appendix C Historical Investigations – Summary Tables of Groundwater Analytical Results

Project Number: 61873
Project Name: HaleCP Rosehill

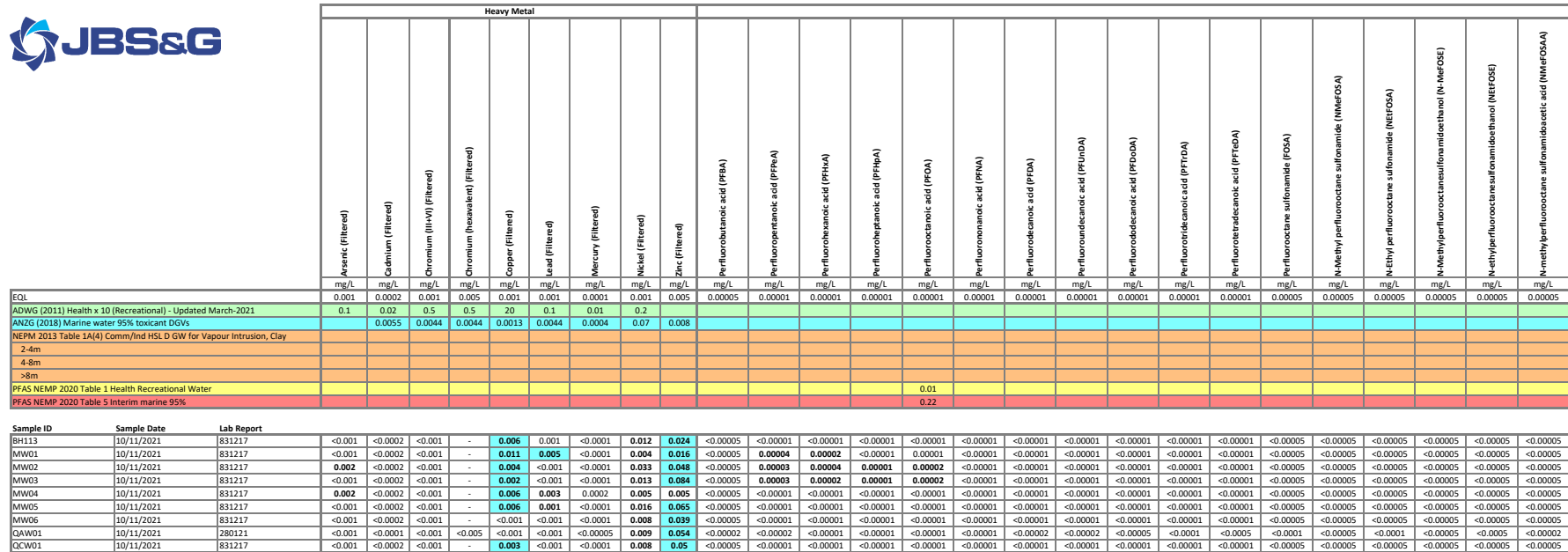


Table B: Groundwater Analytical Results
Project Number: 61873
Project Name: HaleCP Rosehill



			PFAS																							
			N-ethyl-perfluorooctanesulfonamidoacetic acid (NEFOSAA)	Perfluoropropane sulfonic acid (PFPrS)	Perfluorobutanesulfonic acid (PFBS)	Perfluoropentanesulfonic acid (PFPeS)	Perfluorohexanesulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	1H,1H,2H,2H-perfluorohexanesulfonic acid (6:2 FTSA)	1H,1H,2H,2H-perfluorooctanesulfonic acid (8:2 FTSA)	1H,1H,2H,2H-perfluorodecane sulfonic acid (10:2 FTSA)	Sum of PFHxS and PFOS	Sum of all health PFAS (PFHxS + PFOS + PFDA)*	Sum of US EPA PFAS (PFOS + PFDA)*	Sum of PFAS (WADDER List)	Sum of PFAS	1-Chloronaphthalene	2-Chloronaphthalene	2-methylnaphthalene	3-methylnaphthalene	7,12-dimethylbenz[a]anthracene	Acenaphthene	Acenaphthylene	Anthracene
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL			0.00005	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00005	0.00001	0.00001	0.00001	0.00001	0.00005	0.00001	0.005	0.005	0.005	0.005	0.005	0.001	0.001	0.001
ADWG (2011) Health x 10 (Recreational) - Updated March-2021																										
ANZG (2018) Marine water 95% toxicant DGVs																										
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Clay																										0.0004
2-4m																										
4-8m																										
>8m																										
PFAS NEMP 2020 Table 1 Health Recreational Water														0.002												
PFAS NEMP 2020 Table 5 Interim marine 95%								0.00013																		
Sample ID	Sample Date	Lab Report	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001
BH113	10/11/2021	831217	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001
MW01	10/11/2021	831217	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001
MW02	10/11/2021	831217	<0.00005	<0.00001	0.00003	0.00003	0.00017	<0.00001	0.00011	<0.00001	<0.00001	<0.00005	<0.00001	<0.00001	0.00028	0.0003	0.00013	0.00041	0.00044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001
MW03	10/11/2021	831217	<0.00005	<0.00001	<0.00001	<0.00001	0.00003	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.00001	0.00003	0.0005	0.00002	0.00011	0.00011	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001
MW04	10/11/2021	831217	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001
MW05	10/11/2021	831217	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001
MW06	10/11/2021	831217	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001
QAW01	10/11/2021	280121	<0.00002	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00002	<0.00001	<0.00001	<0.00002	<0.00001	-	<0.00001	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
QCW01	10/11/2021	831217	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001

Table B: Groundwater Analytical Results
Project Number: 61873
Project Name: HaleCP Rosehill



			JBS&G																																
			Benz(a)anthracene	Benz(a)pyrene	Benz(b)fluoranthene	Benz(b+h)fluoranthene	Benz(g,h,i)perylene	Benz(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene - PAH	Phenanthrene	Pyrene	2,3,4,6-Tetrachlorophenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,6-Dichlorophenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	3,8,4-Methylphenol (m&p-cresol)	4,6-Dinitro-2-methylphenol	4-chloro-3-methylphenol	4-Nitrophenol	Pentachlorophenol	Phenol	Bis(2-chloroethoxy) methane	Heptachloroethane	
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL			0.001	0.001	0.001	0.004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.01	0.01	0.01	0.003	0.003	0.03	0.003	0.003	0.003	0.003	0.01	0.006	0.03	0.01	0.03	0.01	0.003	0.005	0.005
ADWg (2011) Health x 10 (Recreational) - Updated March-2021				0.0001															0.2	2					3							0.1			
ANZG (2018) Marine water 95% toxicant DOVs				0.0002							0.0014			0.07	0.002																0.022	0.4			
NEMP 2013 Table 1A(4) Comm/ind HSL D GW for Vapour Intrusion, Clay														NL																					
2-4m														NL																					
4-8m														NL																					
>8m														NL																					
PFAS NEMP 2020 Table 1 Health Recreational Water																																			
PFAS NEMP 2020 Table 5 Interim marine 95%																																			
Sample ID	Sample Date	Lab Report	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<0.03	<0.01	<0.003	<0.005	<0.005
BH113	10/11/2021	831217	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<0.03	<0.01	<0.003	<0.005	<0.005
MW01	10/11/2021	831217	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<0.03	<0.01	<0.003	<0.005	<0.005
MW02	10/11/2021	831217	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<0.03	<0.01	<0.003	<0.005	<0.005
MW03	10/11/2021	831217	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<0.03	<0.01	<0.003	<0.005	<0.005
MW04	10/11/2021	831217	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<0.03	<0.01	<0.003	<0.005	<0.005
MW05	10/11/2021	831217	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<0.03	<0.01	<0.003	<0.005	<0.005
MW06	10/11/2021	831217	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<0.03	<0.01	<0.003	<0.005	<0.005
QAW01	10/11/2021	280121	<0.002	<0.002	-	<0.004	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.002	<0.002	<0.002	<0.004	<0.02	<0.01	<0.02	<0.01	<0.002	<0.005	<0.002	
QCW01	10/11/2021	831217	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<0.03	<0.01	<0.003	<0.005	<0.005

Table B: Groundwater Analytical Results
Project Number: 61873
Project Name: HaleCP Rosehill



			Hexachloropropene	1,2,3,4-tetrachlorobenzene	1,2,3,5- tetrachlorobenzene	1,2,3-trichlorobenzene	1,2,4,5-tetrachlorobenzene	1,2,4-trichlorobenzene	1,2-Dichlorobenzene	1,3,5-trichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	Hexachlorobenzene	Pentachlorobenzene	Pentachloroethane	Benzyl alcohol	Dibenzidyl chloride	Acetophenone	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl) ether	Isophorone	4-bromophenyl phenyl ether	4-chlorophenyl phenyl ether	1,3-Dinitrobenzene	2,4-Dinitrobenzene	2,6-dinitrobenzene	Nitrobenzene	2-Picoline	4-aminobiphenyl	Pentachloronitrobenzene	Nitrosomorpholine	Nitrosopiperidine	2-methyl-5-nitroaniline	
			mg/L	mg/L			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL			0.002	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.002	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	
ADWG (2011) Health x 10 (Recreational) - Updated March-2021									15																							0.3		
ANZG (2018) Marine water 95% toxicant DOVs				0.004	0.005		0.005	0.08		0.013			0.4	0.0001	0.002																			
NEMP 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour intrusion, Clay																																		
2-4m																																		
4-8m																																		
>8m																																		
PFAS NEMP 2020 Table 1 Health Recreational Water																																		
PFAS NEMP 2020 Table 5 Interim marine 95%																																		

Sample ID	Sample Date	Lab Report	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	
BH113	10/11/2021	831217	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-
MW01	10/11/2021	831217	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-
MW02	10/11/2021	831217	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-
MW03	10/11/2021	831217	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-
MW04	10/11/2021	831217	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-
MW05	10/11/2021	831217	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-
MW06	10/11/2021	831217	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-
QAW01	10/11/2021	280121	<0.002	-	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
QCW01	10/11/2021	831217	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-

Project Number: 61873
Project Name: HaleCP Rosehill

[illegible]

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Project Name: HaleCP Rosehill

[illegible]

Table B: Groundwater Analytical Results
Project Number: 61873
Project Name: HaleCP Rosehill



			Hexachlorocyclopentadiene	Bis(2-ethylhexyl) phthalate	Butyl benzyl phthalate	Diethylphthalate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	Pronamide	Trifluralin	Dibenzofuran	Benzyl chloride	Hexachlorobutadiene	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	Total MAH	tert-butylbenzene	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
EQL			0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.001	0.001	0.001	0.001	0.002	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.001	0.001	0.001	0.001	
ADWG (2011) Health x 10 (Recreational) - Updated March-2021			0.1						0.7	0.9				0.007	0.01	8	3			6							0.3						
ANZG (2018) Marine water 95% toxicant DGVs															0.7	0.18	0.08		0.075											0.27	0.4	1.9	
NEMP 2013 Table 1A(4) Comm/ind HSL D GW for Vapour Intrusion, Clay																																	
2-4m															30	NL	NL			NL													
4-8m															30	NL	NL			NL													
>8m															35	NL	NL			NL													
PFAS NEMP 2020 Table 1 Health Recreational Water																																	
PFAS NEMP 2020 Table 5 Interim marine 95%																																	
Sample ID	Sample Date	Lab Report	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.001	<0.001	-	-	-	-	<0.001	<0.003	-	<0.001	<0.001	<0.001	<0.001
BH113	10/11/2021	831217	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.001	<0.001	-	-	-	-	<0.001	<0.003	-	<0.001	<0.001	<0.001	<0.001
MW01	10/11/2021	831217	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.001	<0.001	-	-	-	-	<0.001	<0.003	-	<0.001	<0.001	<0.001	<0.001
MW02	10/11/2021	831217	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.001	<0.001	-	-	-	-	<0.001	<0.003	-	<0.001	<0.001	<0.001	<0.001
MW03	10/11/2021	831217	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.001	<0.001	-	-	-	-	<0.001	<0.003	-	<0.001	<0.001	<0.001	<0.001
MW04	10/11/2021	831217	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.001	<0.001	-	-	-	-	<0.001	<0.003	-	<0.001	<0.001	<0.001	<0.001
MW05	10/11/2021	831217	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.001	<0.001	-	-	-	-	<0.001	<0.003	-	<0.001	<0.001	<0.001	<0.001
MW06	10/11/2021	831217	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.001	<0.001	-	-	-	-	<0.001	<0.003	-	<0.001	<0.001	<0.001	<0.001
QAW01	10/11/2021	280121	<0.005	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	
QCW01	10/11/2021	831217	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.001	<0.001	-	-	-	-	<0.001	<0.003	-	<0.001	<0.001	<0.001	<0.001

Table B: Groundwater Analytical Results
Project Number: 61873
Project Name: HaleCP Rosehill



		VOC																															
		1,1-dichloroethane	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Carbon tetrachloride	Chloroethane	Chloromethane	Dichlorodifluoromethane	Dichloromethane	Trichlorofluoromethane	1,1-dichloroethene	1,1-dichloropropene	2-chlorotoluene	3-chloropropane	4-chlorotoluene	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Trichloroethene	Vinyl Chloride	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-Dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
EOL		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001	
ADWG (2011) Health x 10 (Recreational) - Updated March-2021					0.03					0.03				0.04		0.3							0.5				0.003				15		0.4
ANZG (2018) Marine water 95% toxicant DOVs					1.9	0.9	1.1			0.24				4		0.7							0.07				0.33	0.1		0.08			
NEMP 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Clay																																	
2-4m																																	
4-8m																																	
>8m																																	
PFAS NEMP 2020 Table 1 Health Recreational Water																																	
PFAS NEMP 2020 Table 5 Interim marine 95%																																	
Sample ID	Sample Date	Lab Report																															
BH113	10/11/2021	831217	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.005	<0.005	<0.001	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	-	-	<0.001	<0.001	<0.001
MW01	10/11/2021	831217	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.005	<0.005	<0.001	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	-	-	<0.001	<0.001	<0.001
MW02	10/11/2021	831217	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.005	<0.005	<0.001	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	-	-	<0.001	<0.001	<0.001
MW03	10/11/2021	831217	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.005	<0.005	<0.001	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	-	-	<0.001	<0.001	<0.001
MW04	10/11/2021	831217	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.005	<0.005	<0.001	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	-	-	<0.001	<0.001	<0.001
MW05	10/11/2021	831217	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.005	<0.005	<0.001	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	-	-	<0.001	<0.001	<0.001
MW06	10/11/2021	831217	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.005	<0.005	<0.001	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	-	-	<0.001	<0.001	<0.001
QAW01	10/11/2021	280121	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	<0.01	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001
QCW01	10/11/2021	831217	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.005	<0.005	<0.001	<0.005	<0.005	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001

Table B: Groundwater Analytical Results
Project Number: 61873
Project Name: HaleCP Rosehill



	Chlorobenzene	Dibromochloromethane	Chloroform	Tribromomethane	Bromodichloromethane	1,2-dibromoethane	Bromobenzene	Bromomethane	Cyclohexane	Dibromomethane	Iodomethane	4-Methyl-2-pentanone	Acetone	Methyl Ethyl ketone	Carbon disulfide	Chlorinated hydrocarbons EPA Vic	Hexachlorobutadiene	Other chlorinated hydrocarbons EPA Vic	Isopropylbenzene
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.005	0.005	0.005	0.001	0.005	0.001	0.005	0.001
ADWG (2011) Health x 10 (Recreational) - Updated March-2021	3					0.01		0.01					140				0.007		
ANZG (2018) Marine water 95% toxicant DOVs	0.055		0.37																0.03
NEMP 2013 Table 1A(4) Comm/ind HSL D GW for Vapour intrusion, Clay																			
2-4m																			
4-8m																			
>8m																			
PFAS NEMP 2020 Table 1 Health Recreational Water																			
PFAS NEMP 2020 Table 5 Interim marine 95%																			

Sample ID	Sample Date	Lab Report	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	<0.005	-	<0.005	<0.001
BH113	10/11/2021	831217	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	<0.005	-	<0.005	<0.001
MW01	10/11/2021	831217	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	<0.005	-	<0.005	<0.001
MW02	10/11/2021	831217	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	0.025	-	0.025	<0.001
MW03	10/11/2021	831217	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	0.289	-	0.289	<0.001
MW04	10/11/2021	831217	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	<0.005	-	<0.005	<0.001
MW05	10/11/2021	831217	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	<0.005	-	<0.005	<0.001
MW06	10/11/2021	831217	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	<0.005	0.001	<0.005	-	<0.005	<0.001
QAW01	10/11/2021	280121	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	<0.001	<0.001
QCW01	10/11/2021	831217	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	-	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	<0.005	-	<0.005	<0.001	<0.001

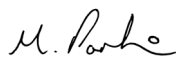
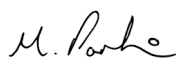
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1.1.1.2 Document Status

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